GLEN ISLE WATERFRONT REDEVELOPMENT
GLEN COVE, NEW YORK

PRE-CONSTRUCTION CONFIRMATORY/DATA GAP SUBSURFACE INVESTIGATION WORK PLAN

PREPARED FOR:

RXR-Glen Isle Partners, LLC
625 RXR Plaza
Uniondale, NY 11556

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

James P. Rhodes, CPG, Senior Vice President jimr@pwgrosser.com
Derek Ersbak, Project Manager dereke@pwgrosser.com

PWGC Project Number: RGI 1304

DECEMBER 2013

P.W. GROSSER CONSULTING, INC.
PROJECT No. RGI 1304

PRE-CONSTRUCTION CONFIRMATORY/DATA GAP SUBSURFACE INVESTIGATION WORK PLAN

GLEN ISLE WATERFRONT REDEVELOPMENT
GLEN COVE, NEW YORK

PREPARED FOR:

RXR Glen Isle Partners, LLC
625 RXR Plaza
Uniondale, NY 11556

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716

PWGC
Strategic Environmental Engineering Solutions

PRE-CONSTRUCTION CONFIRMATORY/DATA GAP SUBSURFACE INVESTIGATION WORK PLAN
GLEN ISLE WATERFRNT REDEVLOPMENT
GLEN COVE, NEW YORK

TABLE OF CONTENTS **PAGE**

FIGURES

APPENDICES

1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared the following Pre-Construction Confirmatory / Data Gap Subsurface Investigation Work Plan (SIWP) in accordance with approved Glen Cove Ferry Terminal Site Management Plan (SMP) and the draft Li Tungsten SMP developed for the site to outline procedures and a scope of work intended to document current subsurface conditions at the Glen Isle (GI) Waterfront Redevelopment site for purposes of characterizing the Site for subsequent insurance coverage and as a condition of closing on the property.

1.1 Project Background

The GI site includes seven parcels, all of which are impacted by environmental contamination as a result of past uses. The parcels include:

1. Li Tungsten Federal Superfund Site
2. Captain's Cove New York State Superfund Site (including a delisted portion)
3. Anglers Club
4. Gladsky Property
5. City of Glen Cove Sewage Pumping Station
6. Doxey Property
7. The Gateway Properties

In addition, there are several properties adjacent to the GI Subject Properties that contain environmental concerns that have potential to impact the GI Subject Properties. These include:

1. Mattiace Petrochemical Federal Superfund Site
2. Crown Dykman New York State Superfund Site
3. Konica Minolta Site
4. Slantfin Property

Figure 1 is a map depicting the GI Subject Properties, adjacent properties and the immediate vicinity. Although the Doxey Property is part of the Site, it is currently being remediated and is not in the required condition for purchase. Therefore, it is not included in this investigation. The Gateway Properties are not part of the Site and are not part of this investigation. Neither Doxey nor the Gateway Properties are discussed below.

1.1.1 *Li Tungsten Federal Superfund Site*

The Li Tungsten Site is located at 63 Herb Hill Road in Glen Cove. Industrial operations at the site took place from approximately 1940 through 1984, under a succession of corporate entities, some of which were not related to each other. The first industrial use of the site was as a leather belting facility. However, during most of the period of industrial activity at the site, operations involved the processing of ore and scrap tungsten concentrates to ammonium paratungstate to form tungsten powders.

Parcel A is an approximately seven-acre parcel formerly occupied by buildings and paved areas. Most of the processing activities took place on Parcel A, including outdoor storage of scrap for processing. Parcel A is bordered to the south by Glen Cove Creek, to the west by Doxey, to the east by the Gateway Properties, and to the north, across Herb Hill Road, by Parcel B and Crown Dykman. Parcel B is an approximately six-acre, primarily undeveloped parcel that was predominantly used for parking as well as some disposal of ore residuals. Parcel B is bordered to the north by The Place (a local street) and residential properties, to the south, across Herb Hill Road, by Parcel A, to the east by Crown Dykman, and to the west, across Dickson Street, by Parcel C. Parcel C is approximately 10 acres, divided into Upper C and Lower C, and was used for wastewater treatment, processing, storage and disposal of ore residuals. Parcel C is northwest of Parcel A, with Doxey to the south, residential to the north and Mattiace as well as Parcel C prime to the west. Parcel C prime is an approximately four-acre undeveloped parcel and is bordered to the north by residential properties, to the west by a vacant undeveloped property, to the south by Mattiace, and to the east by Parcel C. These parcels total approximately 27 acres in size. **Figure 2** is a layout of Parcels A, B, and C that are oriented on opposite sides of Herb Hill Road and Dickson Street.

Li Tungsten – Summary of Regulatory Involvement

The Site was listed on the EPA's National Priority List (NPL), which is the list of Federal Superfund sites, on October 14, 1992. The EPA conducted a remedial investigation at the site from 1993 to 1998 which concluded that the primary contaminants for the site are heavy metals and radionuclides. Based upon the results, the EPA issued a Record of Decision (ROD) which required excavation and off-site disposal of contaminated soil and additional remedial actions. The ROD established the following Operable Units (OU):

- OUI Li Tungsten Facility;
- OUII Captain's Cove (The portions of the Captain's Cove site where Li Tungsten radioactive ore residuals were disposed);
- OUIII Building Survey and Remediation; and
- Creek (This OU was established in 2005)

OUIII was deleted in December 1998 after a fire occurred in the Dice Buildings on Parcel A. The EPA decided to raze the buildings, thus rendering OUIII unnecessary.

In May 2005, the EPA issued an Explanation of Significant Difference (ESD), which amended the ROD. Based upon the ESD, the site is appropriate for residential use with restrictions and further evaluation necessary for Parcel A, prior to decision. In addition, the ESD added two additional radionuclide's (Thorium 230 and Radium 228). A March 2005 ESD added the Glen Cove Creek as OUIV due to radioactive ore residuals identified in the sediments in September 2000.

The EPA evaluated the Site using Site-Wide Cleanup Levels (SWCLs) developed to be protective of human health and the environment for restricted residential use as follows:

PARAMETER	EPA SITE-WIDE CLEANUP LEVELS
Arsenic	24 mg/Kg

Lead	400 mg/Kg
Thorium-230 + Thorium 232	≤5 pCi/g + background *
Radium-226 + Radium-228	≤5 pCi/g + background *
PCBs (Parcel B)	1 mg/Kg in the top 2 feet
PCBs (Parcel B)	10 mg/Kg below the top 2 feet

Notes:

mg/Kg = Parts per million (ppm)

pCi/g = picocuries/gram

Background is approximately 1 pci/g for each isotope

Li Tungsten – Parcel A

Remedial activities on Parcel A, performed as part of Phase I were completed in 2000. As part of this remedial effort, all of the above ground portions of the buildings at Parcel A were demolished to allow for removal of tanks, piping and wastes (except for the Lounge Building which was not contaminated). In addition, the EPA excavated contaminated soil at 28 discrete areas located on Parcel A, at depths ranging from 1 to 12 feet. These areas were identified as part of the remedial investigation completed in May 1998. These excavations did not extend to the bulkhead, and building slabs/ foundations were not removed. Twelve endpoint samples were collected for arsenic and lead and 22 samples were analyzed for Radium-226 and Thorium-232. Results are summarized below:

- Arsenic: 12 endpoint samples, 6 exceeded the SWCL of 24 mg/Kg, highest concentration was 580 mg/Kg in one of the composite samples.
- Lead: 12 endpoint samples met the SWCL of 400 mg/Kg.
- Radium-226: 22 endpoint samples, no exceedances.
- Thorium-232: 22 endpoint samples, one exceedance of 5.9 pCi/g with three* other samples above 4 pCi/g (Note: *these samples may exceed the Thorium-230/232 combined cleanup level of 5.0 pCi/g added by the 2005 ESD).

In addition, as part of the Phase II remedial activities, an “Exempt Area” was excavated on Parcel A in 2003. This area was identified during the remedial investigation, but had initially been “exempted” as part of the Phase I remediation due to logistical difficulties encountered during the remedial effort. Detailed information regarding the volume of soil excavated is not available, but it was reported to be located near the creek along the Doxey-Parcel A border. A composite endpoint sample analyzed for Radium and Thorium indicate no exceedances. **Figure 2A** indicates areas of remaining impact on Parcel A.

Glen Isle conducted limited “verification” sampling in 2003 to identify data gaps and gain soil quality information in areas not sampled and/or remediated by EPA. The verification sampling identified elevated levels of SVOCs, arsenic and mercury in soils throughout the entire site at varying depths. The EPA radiological consultant accompanied Glen Isle during the field program to survey radioactivity at the sample locations, and no exceedances were detected. **Figure 2A** indicates the verification sampling locations and results.

Li Tungsten – Parcel B

Remedial activities on Parcel B, performed as part of Phase II activities, were completed in 2007. As part of this remedial effort, soil throughout the Parcel impacted with arsenic, lead, PCBs, and radiological contaminants was excavated and disposed off-site.

Impacted soil was excavated in increments of one-foot after which a Remedial Action Support Survey (RASS) was performed. The RASS consisted of a detailed surficial instrumentation scan of the remaining soil using portable gamma radiation detectors for radiological contaminants and XRF instrumentation for metals impacts. Samples were also collected for PCBs during excavation in order to determine when SWCLs had been achieved.

Following excavation, a Final Status Survey was performed to demonstrate that Parcel B meets the SWCLs specified in the ROD/ESD. The Final Status Survey Report (FSSR) has been completed in draft. The FSSR indicates that SWCLs have been achieved, with the exception of the northern portion of the PCB remediation area. Confirmatory sampling indicated that soils remaining in the northern portion of the PCB remediation area contain concentrations of PCBs slightly exceeding 1 mg/Kg. The SWCL for PCBs in subsurface soils (greater than two feet below grade) is 10 mg/Kg, while the SWCL for surface soils is 1 mg/Kg. Therefore, a two-foot clean fill cover was placed over this area. This cover must be maintained in order to meet the ROD/ESD SWCL. Correspondence from EPA states that the remediated soil from other parts of Parcel B was used as cover in the area where PCBs exceeded 1 mg/kg. Although the FSSR indicates that the SWCLs have been achieved (with the exception of the PCB soils which require a two-foot cover) a review of endpoint soil sample data indicates that one sample exceeded the SWCL for arsenic. Endpoint soil sample locations and results are shown on **Figures 2B.1** through **2B.3**. In addition, the FSSR indicated that field screening for radiological constituents and metals was performed during and following excavation. Field screening for metals utilizing XRF instrumentation indicated that several areas contained arsenic and lead concentrations exceeding the SWCLs. However, a statistical analysis determined that SWCLs were met.

Li Tungsten – Lower Parcel C

Remedial activities on Parcel C, performed as part of Phase I were completed in 2001. As part of this remedial effort, soil was screened for radiological and heavy metal contamination and excavated in two-foot lifts until either acceptable screening levels were encountered or to the top of the groundwater table. Material that met acceptable screening levels was re-screened in six inch lifts. If acceptable, this material was used as backfill. Material that was not acceptable for backfill was staged in the Dickson Warehouse pending disposal. Ultimately, most of the aerial extent of lower C required excavation (approximately 4 acres). Excavation depths ranged from 4 feet to 14 feet.

Ten endpoint samples were collected and analyzed for arsenic and lead. Three of the ten samples were also submitted for Radium-226 and Thorium-232 analyses. The endpoint sampling was performed prior to the May 2005 ESD, and therefore do not include Radium-228 or Thorium-230, which are radioactive isotopes that are specifically identified in the SWCLs (in addition to Radium-226 and Thorium-232). The endpoint samples were composites from five locations. Results are summarized below:

- Arsenic: 10 endpoint samples, 8 exceeded the SWCL of 24 mg/Kg, highest concentration was 1,120 mg/Kg in composite sample
- Lead: 10 endpoint samples, 4 exceeded SWCL of 400 mg/Kg, highest concentration was 807 mg/Kg in composite sample.
- Radium-226: 3 endpoint samples, no exceedances.
- Thorium-232: 3 endpoint samples, no exceedances.

In addition, as part of the Phase II remedial activities, two “Exempt Areas” were excavated on Lower Parcel C in 2003. These areas had initially been “exempted” as part of the Phase I remediation due to logistical difficulties encountered during the remedial effort. Detailed information regarding the volume of soil excavated is not available. Endpoint samples were analyzed for radium, thorium, arsenic, and lead. Results indicate no exceedances for radium or thorium. However, several of the samples contained exceedances of both arsenic and lead. **Figure 2C.1** shows the location of endpoint samples and results.

Glen Isle conducted limited “verification” sampling in 2003 to identify data gaps and gain soil quality information in areas not sampled and/or remediated by EPA. The verification sampling identified elevated levels of SVOCs, arsenic chromium, and mercury in soils at varying depths. **Figure 2C.1** indicates the verification sampling locations and results.

Li Tungsten – Upper Parcel C

In 2004, 5,180 tons of radiologically contaminated soil and debris stored in the Dickson Warehouse was characterized and properly disposed. This interim remedial effort also included limited excavation of Upper Parcel C. This remedial effort included the excavation of two separate areas of known soil contamination (RA-A and RA-B) to a depth of approximately 24-inches. Upon completion, a total of 3,527 tons of radiologically impacted soils were excavated and disposed off-site. This effort focused on the bulk excavation and removal of soils with radiological contamination. Therefore, endpoint sampling and MARSSIM surveys were not performed at that time, but were performed as part of a Final Status Survey, which is discussed below.

Excavation of metals and radiologically impacted soils on Upper Parcel C were further performed in 2006 and 2007. Impacted soils identified were excavated in increments of one-foot or less so that a Remedial Action Support Survey (RASS) could be completed. The RASS consisted of a detailed instrumentation scan of the remaining soils surfaces using portable gamma radiation detectors for radiological contaminants and XRF instrumentation for metals impacts.

Following excavation, a Final Status Survey was performed to demonstrate that Upper Parcel C meets the SWCLs. The FSSR has been completed in draft and indicates that SWCLs have been achieved, with the exception of an area west of the Dickson Warehouse. Arsenic and lead were detected at concentrations exceeding SWCLs in endpoint soil samples collected in the vicinity of a storm drain system and electric utility. In order to identify the remaining impacted soil, a 15-mil puncture resistant poly sheeting barrier was installed prior to backfilling the excavation. Although the FSSR indicates that the SWCLs have been achieved (with the exception of an area west of the Dickson Warehouse) a review of endpoint soil sample data indicates that one sample exceeded the SWCL for arsenic. In addition, the FSSR indicated that field screening for radiological constituents and metals was performed during and following excavation. Field screening for metals utilizing XRF instrumentation indicated that several areas contained arsenic and lead concentrations exceeding the SWCLs. However, a statistical analysis determined that SWCLs were met. The FSSR did indicate that there may be isolated lead and arsenic "hot spots" throughout Upper Parcel C. Finally, the FSSR data indicates that several samples collected outside and adjacent to the Benbow Building exceeded the SWCLs for radium and thorium. No sampling was performed in the Benbow Building. The Benbow Building and the Dickson Warehouse are planned for demolition. Confirmation / data gap sampling will be performed following demolition in the former footprint of the building as part of this investigation. Endpoint soil sample locations and results are shown on **Figures 2C.1** and **2C.2**.

In 2007 and 2008, stockpiled soils contained in the Dickson Warehouse (from the Upper Parcel C and Parcel B excavation effort) were removed and properly disposed off-site. Following disposal, the Dickson Warehouse was decontaminated. The decontamination effort included vacuuming the horizontal surfaces within the building utilizing HEPA vacuum units, Tennant sweepers and man lifts to access elevated areas of the structure. Following the removal of dust and residual sediment, radiological scanning procedures were performed in order to identify remaining areas of elevated radiological activity. Elevated activity levels were found in areas of the concrete block walls (interior and exterior), the foundation walls (exterior), the concrete floor, and areas of the roof (near positive and passive vents as well as gutters). Several different types of scarifying equipment were used in order to decontaminate these areas. Following scarification, the areas were resurveyed for radiological activity. Decontamination was continued until the surveys did not detect the presence of radiological activity. However, based upon the results of the remedial investigation no remediation was performed beneath the building.

Li Tungsten – Parcel C Prime

Parcel C Prime is approximately four acres and consists of undeveloped/undisturbed land adjacent to the west of Parcel Upper C. Parcel C Prime was separated as an area that did not require remedial action by the EPA, based upon the remedial investigation data. Therefore, no remedial activities were performed in this area. Background soil samples were collected for metals and radiological compounds as part of the Final Status Survey. Sample location and results are shown on **Figures 2C.1** and **2C.2**.

1.1.2 *Captain's Cove New York State Superfund Site*

The Captain's Cove Site (Captain's Cove) is located on the western end of Garvies Point Road in Glen Cove, New York. The site is bordered by Glen Cove Creek to the south, City-owned property (beach) to the west, the Garvies Point Road and Garvies Point Preserve to the north, and the Glen Cove Angler's Club to the east. The total Captain's Cove site encompasses approximately 23 acres, including an estimated 4 acres of tidal wetlands along the site's southern boundary bordering Glen Cove Creek. Refer to **Figure 3** for a plan view of the different areas of the site.

Historically, the land at the Captain's Cove site was used as a port and for recreation including boating, fishing and swimming. Prior to the 1960s, two tidal channels and an associated marsh were prominent at the site. One narrow channel extended from Garvies Point Road (near what is currently the west gate) to the northwest portion of the wetland. The second tidal channel was broad and extended from Glen Cove Creek to just south of Garvies Point Road, on the east side of the site. Based on aerial photographs, the tidal channels were filled between 1966 and 1969 and the site became essentially flat.

Beginning in the late 1950s and continuing until approximately the late 1970's, the Captain's Cove site was predominantly used as a "community dump" by the City of Glen Cove for the disposal of incinerator ash, sewage sludge, rubbish, household debris, and creek sediments. The site was also used by local industry, including the former Li Tungsten operation for the disposal of industrial wastes. Low levels of radioactive ore residuals from the Li Tungsten facility were disposed of on the western and eastern ends of the property.

Captain's Cove was purchased by Village Green Realty at Garvies Point, Inc. (Village Green Realty) in 1983 with the intention of developing a residential complex at the site. Redevelopment efforts were abandoned in 1986 when the NYSDEC designated the property as a Class 2 Inactive Hazardous Waste Site (State Superfund Site) as a result of organic and inorganic contamination in soil and groundwater at the site. Several condominium structures (condo shells) were partially constructed on-site prior to the State Superfund designation and were never completed. These structures were demolished by the City of Glen Cove prior to the start of the remedial action. However, foundations or portions of foundations were left behind.

The NYSDEC entered into an Administrative Order-on-Consent with the City of Glen Cove in March, 1997 for the City to implement a remedial investigation/feasibility study (voiding the 1988 order with the former owner). A NYSDEC ROD was issued in March of 1999 indicating that the selected remedy for the site will consist of landfill excavation and reclamation and deed restriction. The NYSDEC utilized the Recommended Soil Cleanup Objectives (RSCOs) contained in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4046 for the site at the time of the ROD. Another Administrative Order-on-Consent was issued in May of 1999 to include the remedial design and remedial action. A September 1999 EPA ROD for the Li Tungsten Site included a portion of the Captain's Cove Site identified as OUII. The EPA evaluated the Site using SWCLs developed to be protective of human health and the environment as follows:

PARAMETER	**EPA SITE-WIDE CLEANUP LEVELS**
Arsenic	24 mg/Kg
Lead	400 mg/Kg
Thorium 232	5 pCi/g
Radium-226	5 pCi/g

Notes:

mg/Kg = Parts per million (ppm)

pCi/g = picocuries/gram

In May 2005, the EPA issued an ESD, which amended the September 1999 ROD. The EPA evaluated the Site using SWCLs developed to be protective of human health and the environment for restricted residential use as follows:

PARAMETER	EPA SITE-WIDE CLEANUP LEVELS
Arsenic	24 mg/Kg
Lead	400 mg/Kg
Thorium-230 + Thorium 232	$\leq$5 pCi/g + background *
Radium-226 + Radium-228	$\leq$5 pCi/g + background *

Notes:

mg/Kg = Parts per million (ppm)

pCi/g = picocuries/gram

Background is approximately 1 pci/g for each isotope

Remedial Investigation

The remedial investigation of Captain's Cove was performed at the site from May 1997 through December 1997. The purpose of the remedial investigation was to define the extent and nature of any contamination resulting from previous site activities. The remedial investigation identified areas of environmental concern (AECs) detailed below:

- Elevated levels of metals in the groundwater in the western third of Captain's Cove, down gradient of Li Tungsten tailings;
- Elevated levels of VOCs in the groundwater in the northeastern corner of Captain's Cove, down gradient of the Mattiace Petrochemical Site;
- Elevated levels of VOCs and methane (from decomposition of waste) in soil gas as a result of municipal waste and fill in the central portion and the leaching of metals and VOCs through the soil and waste material; and
- Elevated levels of metals and organic compounds in the wetland sediments.
- Elevated levels of SVOCs and metals in surface soils.
- Elevated levels of VOCs, SVOCs, and metals in subsurface soils.

In addition, none of the samples taken during the remedial investigation within the footprint of the landfill had elevated radiation readings. The location of the remedial investigation samples and results are shown on **Figure 3A**.

EPA Remedial Action

The EPA mobilized to Captain's Cove in January, 2001 to perform the removal of the radioactive wastes from Area A, Area G, two ancillary areas known as Area A Prime and Area G Prime and a few small contaminated areas. Areas were excavated using a grid approach.

EPA excavated radiologically impacted soils until SWCLs were achieved. However, soils impacted with metals were only excavated to the groundwater table. Area A excavation was performed in 2001 and covered approximately 8 acres. Excavation depths ranged from 2 to 14 feet below grade and ceased when reaching the "natural sandy background material", provided the radiological SWCLs (1999) were achieved. This was demonstrated by post-excavation sample results from the excavation floors that were within the radiological release criteria; however the northern and western walls of the excavation had elevated radiological levels and were remediated during the excavation of Area A Prime. Multiple post-excavation samples for the floor had exceedances of the SWCLs (1999) for arsenic, and/or lead. However, the EPA stated that these exceedances occurred only in cases where excavation extended to the top of the water table.

Area G excavation was performed in 2002 and covered approximately 1.5 acres to depths ranging from 3 feet to 14-feet below grade. Post-excavation sample results for floor samples met radiological release criteria. The walls of the northern and eastern portions of the excavation had elevated radiological levels and were remediated during the excavation of Area G Prime. Excavation ceased when "natural sandy background material" was reached, provided that the SWCLs for radiological constituents were achieved. Multiple post-excavation samples for the floor had exceedances for arsenic (up to 235 mg/Kg at grid location T9, 12-14 feet deep) when compared to the SWCLs (1999). However, the EPA stated that these exceedances occurred only in cases where excavation reached the water table. While excavating Area G Prime a buried barge was identified and was partially demolished during removal of soils.

Figure 3B shows the EPAs limits of excavation and post excavation data.

NYSDEC Remedial Action

The remedial action (RA) mandated by the ROD for the State Superfund portion of the Site was conducted from May 1, 2001 to September 20, 2001 and consisted of excavation with off-site disposal of contaminated soil as well as post-excavation backfilling.

Soils were excavated until virgin/native material was encountered and in some instances were performed below the water table. Visual observations and field screening for VOCs and radiological contamination was performed during excavation to define the extent. Limits of the excavation were bounded by radiological waste areas to the east and west or the storm-water retention basins to the north and Glen Cove creek to the south.

Excavated materials were segregated, screened, stockpiled into 86 piles on-site, and sampled for characterization purposes. Samples were generally analyzed for SVOCs and metals. Of the 86 stockpiles, soil samples from 8 stockpiles exceeded the cleanup criteria for the site and were shipped off-site as non-hazardous waste. 78 stockpiles were approved by the NYSDEC for on-site reuse as fill material, including some material that had concentrations slightly in excess of the RSCOs contained in the NYSDEC TAGM No. 4046. The exceedances included SVOCs and metals. A review of the data indicated that all of the 78 stockpiles exceeded TAGM RSCOs for metals (copper and zinc) and as many as 76 stockpiles exceeded the SVOC objectives.

Dredged sediments from Glen Cove Creek were also used as backfill within an area approximately 50 feet by 50 feet, along the south corner of the west retention pond. The NYSDEC later requested radiation screening of this area and it was reported below acceptable background level at the surface. However, it is possible that radioactive material is present in deeper reused dredge spoils since these spoils were placed prior to the EPA remedial action.

Glen Isle Verification Sampling

Glen Isle conducted limited "verification" sampling in 2003 to identify data gaps and gain soil quality information in areas not sampled and/or remediated by EPA or NYSDEC. The verification sampling identified elevated levels of SVOCs, arsenic, chromium, and mercury in soils at varying depths in the retention basin portion of the site and VOCs, SVOCs, arsenic and mercury at varying depth in the delisted area of the site. **Figure 3A** indicates the verification sampling locations and results.

1.1.3 *Gladsky Site*

The Gladsky Site is located on Garvies Point Road, within the City of Glen Cove, New York. The site is owned by the City of Glen Cove. The approximately 0.8 acre site was utilized as a boat maintenance and repair facility and is bordered by Garvies Point Road to the north, Glen Cove Creek to the south, the Angler's Club Site to the west, and the City of Glen Cove Sewage Treatment Plant Pumping Station to the east. The Gladsky Site, along with the Angler's Club Site and the pumping station are all located on the same tax lot, Section 21, Block A, Lot 12. A site plan is illustrated on **Figure 4A**.

According to the Phase I ESA (May 2000), the site was developed between 1947 and 1950 and has been owned by the City of Glen Cove since at least 1956. In 1957 the property was used as a sand/gravel facility with a mixing tower and stockpiles. Gladsky Marine occupied the site from the 1970s to 1999 at which time the existing building was constructed. The building is a one-story 396 square foot office which was reported to be connected to the municipal water and sanitary sewer systems. The Gladsky Site is enrolled in the NYSDEC Environmental Restoration Program (ERP). In addition, the Angler's Club and Sewage Pumping Station were recognized by the NYSDEC as being part of the Gladsky ERP site.

According to the Phase I ESA, an Environmental Assessment (EA) was performed by Impact Environmental in 1992 for the Gladsky Site. The focus of the EA was an asbestos investigation. Thirteen soil samples were collected from the fill material throughout the site since friable asbestos was suspect. Eight samples were submitted for analysis; six of the samples were positive for asbestos. The conclusion of the investigation stated that a "large area of the property has been contaminated with asbestos containing building materials".

A Phase II Environmental Site Assessment was performed in April 2000 (report dated December 2000) followed by a Supplemental Phase II Environmental Site Assessment performed in 2002, and consisted of soil and groundwater samples. Areas of concern that were identified in the Phase I ESA, and investigated in the Phase II ESAs included topographically low areas, oil stained areas, soil containing ash and rusted metal flakes, the sewer pipe, and the bulkhead area. A total of nine surface, eight subsurface, and five groundwater samples were collected. Soil boring logs indicate that the soil consists primarily of silt and sand. Trace brick and asphalt were noted at two boring locations, which are indicative of fill material.

SVOCs, PCB's, metals, and asbestos are present in surface and/or subsurface soil. Conclusions indicate that contaminants are present above the RSCOs contained in the NYSDEC TAGM No. 4046 to a depth of at least two feet below grade. Subsurface samplings performed from depths 4-6 feet appear to limit the extent of impact to this depth interval. Soil sample locations and results are shown on **Figure 4A**. VOCs were detected in groundwater which was attributed to the up-gradient Mattiace property. Groundwater sample locations and results are shown on **Figure 4B**.

NYSDEC issued a Preliminary Remedial Action Plan ("PRAP") in January 2006 and a ROD in March 2006 for the Gladsky property. The selected remedy allowed for development of restricted residential and included:

- A radiological contamination survey due to the site's proximity to Li Tungsten and Captain's Cove;
- The excavation of contaminated soil (minimum of 2 feet across site) and off-site disposal;
- A site management plan which addresses residual contaminated soils that may be excavated as part of future redevelopment and the evaluation of vapor intrusion for any proposed buildings;
- Institutional control in the form of an environmental easement which restricts the use of groundwater and ensures compliance with the site management plan; and
- Periodic certification of the institutional controls by a Professional Engineer

The City of Glen Cove Industrial Development Agency (IDA) commenced a remedial action at the Gladsky property in April 2010. The remedial action consisted of demolition of existing buildings on the lot, closure of the onsite sanitary system, excavation of soil from the property in exceedance of Restricted –Residential Soil Cleanup Objectives and soil containing asbestos, and removal of an undocumented UST and closure of spill associated with UST. As of to date, the remedial action has been completed and a Remedial Action Closeout Report, Environmental Easement, and SMP are being prepared. The SMP has the same protocols for that developed for Li Tungsten and Captain's Cove.

1.1.4 *Angler's Club Site*

The Angler's Club Site is located on Garvies Point Road, in the City of Glen Cove, New York. The site is owned by the City of Glen Cove. The 0.9 acre site is utilized as a clubhouse and a marina and is bordered by Garvies Point Road to the north, Glen Cove Creek to the south, the Captain's Cove property to the west, and the Gladsky property to the east. Anglers Club, along with the Gladsky property and the pumping station is identified as Section 21, Block A, Lot 12. The Angler's Club was included initially as part of the Gladsky ERP site and removed at a later date. A site plan is illustrated on **Figure 4A**.

According to the Phase I ESA (May 2000), the site was developed between 1947 and 1950 with a building and boat storage and has been owned by the City of Glen Cove since at least 1956. The building is a one-story 1,250 square foot clubhouse, constructed of wood. The clubhouse is connected to the municipal water and sanitary sewer systems. According to the Phase I ESA (May 2000), a permit for a 1,000 gallon underground fuel oil tank was approved in 1967, however the Phase I ESA did not provide a copy of the permit or identify the agency that approved the tank.

A Phase II Environmental Site Assessment was performed in April 2000 (report dated December 2000), and consisted of soil and groundwater samples. Areas of concern that were identified in the Phase I ESA and investigated in the Phase II ESA, include the underground fuel oil storage tank, areas of chemical storage, a metal-lined pit, the backflow prevention system discharge pipe, and the bulkhead area. A total of four surface samples, three subsurface samples, one sediment sample from the metal-lined pit, and four groundwater samples were collected. Soil boring logs indicate that the soil consists primarily of silt and sand. Trace brick and asphalt were noted at two boring locations, which are indicative of fill material.

SVOCs and metals are present in surface/subsurface soil and sediment above the RSCOs contained in the NYSDEC TAGM No. 4046. Soil sample locations and results are shown on **Figure 4A**. VOCs were detected in groundwater which was attributed to the up-gradient Mattiace property. Groundwater sample locations and results are shown on **Figure 4B**.

1.1.5 *City of Glen Cove Pumping Station*

The City of Glen Cove Sewage Pumping Station property is located on Garvies Point Road, in Glen Cove, New York. The site is owned by the City of Glen Cove. The approximately 0.2 acre site is utilized to transfer municipal wastewater to the City of Glen Cove Sewage Treatment Plant located to the south, across the Glen Cove Creek. The Pumping Station is bordered by Garvies Point Road to the north, Glen Cove Creek to the south, Gladsky to the west, and Doxey to the east. The Pumping Station, along with the Anglers Club and the Gladsky property is identified as Section 21, Block A, Lot 12. The Pumping Station was included initially as part of the Gladsky ERP site and removed at a later date. A site plan is illustrated on **Figure 4A**.

According to the Phase I ESA (May 2000), the site was developed between 1947 and 1950 and has been owned by the City of Glen Cove since at least 1956. In 1957 the property was used as a sand/gravel facility with a mixing tower and stockpiles. The pump house was constructed in 1966.

A Phase II Environmental Assessment was performed, and consisted of soil and groundwater samples. The Phase II ESA indicated that the soil consists primarily of silt and sand, with lenses of clay. The portions of the report that were provided indicate that six soil samples were collected from four locations, and two groundwater samples were collected. Soil and groundwater samples were submitted for VOCs, SVOCs, PCBs/Pesticides, and metals (total and dissolved for groundwater) analyses. In addition, soil samples were submitted for asbestos analysis.

Areas of impacted soils and groundwater exist on the Pumping Station site. These include areas containing elevated concentrations of SVOCs and metals in the soils and VOCs in the groundwater. Soil sample locations and results are shown on **Figure 4A**. Groundwater sample locations and results are shown on **Figure 4B**. It is also possible that contaminants associated with sanitary wastes may be present in the subsurface. There has not been an evaluation for radiological contamination at the site.

1.1.6 *Glen Cove Creek*

A March 2005 ESD added the Glen Cove Creek as Li Tungsten's OUIV due to radioactive ore residuals identified in the sediments in September 2000. The ESD required dredging of the creek to remediate radioactive ore residuals.

Prior to the March 2005 ESD, the US Army Corps of Engineers (USACE) initiated dredging in September of 2000. As part of the dredging process, a dewatering pad was constructed on Parcel A to collect water from the dredge spoils. Spoils surveyed by the EPA resulted in the identification of ore residuals. Sampling and a gamma survey of the creek bottom were performed in October of 2001 and identified several areas of radiological contamination above background levels.

Dredging of the creek sediments was continued by the USACE in late 2006 and into 2007. The EPA screened the spoils, separated the radioactive ore residuals, and placed the ore residuals in the Dickson Building for disposal. Non-radiological dredge spoils were stockpiled on Parcel A and are pending disposal.

The remediation of three radiological "hot spots" in the Creek area adjacent to Parcel A was performed in 2007 during the replacement of portions of the bulkhead. These areas were dredged to a depth of eleven feet below mean low water. *The Final Technical Memorandum Gamma Verification Survey for Acceptance Area 3, September 2008* documents the results of the radiological survey performed following the dredging operation. Results indicate that residual radiological impacts exist at depths eleven feet below mean low water in Hot Spot 1 and 2. These areas were not further remediated due to the depth.

1.2 Environmental Summary

Previous environmental investigations / remediation have identified residual environmental impacts as detailed in the table below:

Areas of Potential or Known Remaining Impact

Site	Contaminant	Details
Li Tungsten Parcel A	SVOCs	Elevated in surface/subsurface soils
	Arsenic/Lead	Elevated in soils generally beneath the groundwater table
	Radiological	Elevated at depths greater that 11' in areas adjacent to bulkhead (in creek)
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Li Tungsten Parcel B	PCBs	Areas that exceed the surface soil SWCLs; Clean fill cover must be maintained
	Arsenic/Lead	Elevated in soils at one endpoint sample location and screening data indicated some metals hot spots
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources

Site	Contaminant	Details
Li Tungsten Upper Parcel C	Arsenic/Lead	Elevated in soils at one endpoint sample location, in soil west of Dickson Warehouse and screening data indicated some metals hot spots
	Radiological	Elevated sample results adjacent to the Benbow Building
Li Tungsten Lower Parcel C	SVOCs	Visual petroleum impact beneath former AST slab
	Arsenic/Lead	Elevated in soils generally beneath the groundwater table
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Captain's Cove	SVOCs/Metals	Elevated concentrations in soil that were used as backfill from on-site soils and data for off-site sources of backfill used as part of the EPA remediation are not available
	Arsenic/Lead	Elevated concentrations at the water table in areas excavated by EPA
	Various	Tidal flats, tidal wetlands, sediments directly behind the bulkhead, the Retention Ponds sediment were characterized as part of the RI; however conditions should be verified now that remediation has been completed
	Landfill Waste	Areas not excavated may contain landfill wastes
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Angler's Club	SVOCs/metals	Elevated concentrations in the surface, and shallow subsurface soils
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Gladsky	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Pumping Station	SVOCs/metals	Elevated concentrations in the surface, and shallow subsurface soils

Site	Contaminant	Details
	VOCs	Elevated concentrations in groundwater as a result of up-gradient sources
Glen Cove Creek	Radiological	Radiological contamination contained in to areas at depths greater than eleven feet below mean low water

2.0 PROPOSED REDEVELOPMENT

The site is 56 acres in size that will include residential, commercial and retail space, a hotel and conference center, as well as open space and public amenities. The Phase I construction will be in the eastern portion of the site. It includes two residential buildings designated as Block H and Block I, infrastructure, and subsurface storm water storage/infiltration vaults. Each of the buildings will be five stories high with at-grade and below-ground parking and amenities and four stories of residential space above. The location of the building footprints, storm water vaults and proposed boring locations are shown on **Figure 6**. Building H would generally be a rectangular-shaped structure constructed on the north side of Herb Hill Road that would occupy a plan area of about 70,000 square feet. The finished floor is shown to be established Elevation +24.0 feet, which varies from about 9 feet above to 11 feet below the current surface grades. A small pond is present in the southern portion of the proposed building area, adjacent to Herb Hill Road.

Building I would occupy a plan area of about 88,000 square feet and would be constructed on the south side of Herb Hill Road. A larger pond, that has formed on a concrete slab constructed as a containment area for dredge spoils is present in the central and southwestern portion of the proposed building footprint. The finished floor for Building I is shown to be elevation +21.5 feet, which varies from about four feet below to six and one half feet above the current surface grades. At-grade parking is shown to the east of the building, and both the buildings will have underground stormwater detention/recharge systems constructed adjacent to the buildings.

Reconstruction of Herb Hill Road and Garvies Point Road will take place as part of the Phase I development, as well as the reconstruction of a sewage pumping station and a small slab-on-grade Anglers Club building to the south of Garvies Point Road.

The phase I construction activities will include modification of existing grades at the site through various cuts and fills. **Appendix A** shows the cut/fill plans.

All soils removed on a NYSDEC Inactive Hazardous Waste Site as part of the Garvies Point Redevelopment Area will be managed in accordance with that Site's Site Management Plan.

3.0 STANDARDS, CRITERIA, AND GUIDANCE (SCGS)

Based on previous investigations at the site, the primary chemicals of potential concern (COPC) to be encountered at the site are VOCs, SVOCs, metals, pesticides and PCBs. In addition, there are remaining radiological concerns.

Based upon the current redevelopment plans for the site (mixed use), restricted-residential soil cleanup objectives (RRSCOs) as specified in NYSDEC 6 NYCRR Part 375 will be used to evaluate soil quality. The EPA allowed for increased concentrations of arsenic (24 mg/kg), lead (400 mg/kg) and PCBs (10 mg/kg) in soils below the top two feet for restricted–residential use at the site. In addition, they established cleanup levels for radiological as follows:

PARAMETER	EPA SITE-WIDE CLEANUP LEVELS
Thorium-230 + Thorium 232	≤5 pCi/g + background *
Radium-226 + Radium-228	≤5 pCi/g + background *

Notes:

pCi/g = picocuries/gram

Background is approximately 1 pci/g for each isotope

Groundwater sample results will be compared to the NYSDEC Class GA Ambient Water Quality Standards (AWQS) as specified in the TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and historical groundwater results.

4.0 OBJECTIVES, SCOPE AND RATIONALE

The primary objectives of the work detailed in this plan will be to collect the information and field data necessary to address data gaps and confirm presumed existing conditions prior to beginning Phase I construction activities. Additional objectives are to obtain geotechnical parameters for foundation and storm water retention basin design, characterize soil quality in the areas where utility and foundation excavations will occur, and characterize soil and groundwater quality in the vicinity of the roundabout at the intersection of Herb Hill and Garvies Point Roads. The Scope of Work includes the following tasks:

1. Radiological Walkover Survey/Scan
2. Site Preparation
3. Geophysical Investigation
4. Test Pits
5. Geotechnical Investigation
6. Subsurface Soil Characterization
7. Groundwater Characterization

4.1 Radiological Walkover Survey/Scan

Prior to any intrusive work (test pits, soil borings, etc.) on the Li Tungsten site, a radiological walkover survey/scan will be completed. The radiological walkover survey/scan will follow the procedures established in *Multi-Agency Radiation Survey and Site Investigation Manual, Revision 1* (EPA, August 2000 and June 2001 updates) (MARSSIM) as detailed in the Radiation Monitoring Plan included in **Appendix C**.

4.2 Site Preparation

The site has remained undeveloped for some time and much of the site has been overgrown with vegetation. In order to perform the work detailed below, site preparation will include clearing and grubbing of vegetative overgrowth, creating access paths to the drilling locations, and draining the standing water on Parcels A and B. Parcel B will also be regraded to permit storm water to drain into existing catch basins. Water on Parcel A will be pumped into the existing drain in the dewatering pad, or discharged into swales outside the dewatering pad where it can seep into the ground.

4.2.1 *Clearing and Grubbing / Access Roads*

In order to perform the work detailed in the sections below, areas of the site that are overgrown with vegetation will need to be cleared and have access paths created for the surveyor and drilling equipment to reach the drilling locations. It is anticipated that a GPS-guided bulldozer or equivalent will be used to perform clearing and grubbing activities as well as access development. During site preparation, minimal surface soil disturbance is anticipated except for the southern portion of Parcel B where the site needs to be sloped towards the existing catch basin. In order to protect the workers and surrounding community, air monitoring will be performed as detailed in Section 8.0 during clearing and grubbing activities.

4.2.2 *Storm Water Retention Basin Management*

Two areas exist on the subject property where storm water ponds. These areas were part of previous EPA/US Army Corps of Engineers remediation projects that need to be maintained. The southern portion of Parcel B is not sloped towards the catch basin and storm water has ponded along the road.

A dewatering pad was constructed on Parcel A, as explained previously, for the creek dredging project. This pad has a drain in it and two sumps for removing accumulated storm water. The drain needs to be rehabilitated so it functions as designed, or the sumps need to be used to pump the storm water off of the pad. It is anticipated that storm water will be pumped into holding tanks temporarily and the drain will be cleared so that the basins can operate as designed. Following completion of site activities, storm water accumulated in the holding tanks will be put back into the basins or discharged onto the ground.

4.3 Geophysical Investigation

Historical records indicate that a condominium project was started and abandoned on the Captain's Cove site leaving building foundations in place. A review of the remedial activities performed by EPA and NYSDEC indicated that several areas of the Captain's Cove site were not excavated. In order to determine the absence/presence of former building foundations, a geophysical investigation will be performed.

4.3.1 *Electromagnetic Survey*

The electromagnetic (EM) method uses the principle of electromagnetic induction to measure the variability of electrical conductivity of subsurface materials and the presence of buried metal objects. Significant contrasts in the electrical properties between non-indigenous materials and surrounding soil enable accurate delineation of buried waste materials, fill, and air spaces. The large EM response to metal makes this technique particularly well suited to identifying buried metal objects such as underground storage tanks (USTs), metallic wastes, buried drums, pipelines, reinforced building foundations, or other metal components of buried structures. It is, however, equally sensitive to metal objects on the ground surface, and it is important to take careful field notes that indicate the position of surface metal to avoid mis-interpretation.

A Geonics EM-61 high-resolution time domain metal detector, or equivalent, will be used to conduct the first phase of the investigation. The EM-61 is used to detect both ferrous and non-ferrous metals buried in the upper 10 feet of the subsurface. A powerful transmitter generates a pulsed primary magnetic field, which induces eddy currents in nearby metal objects. The decay of these currents is measured by upper and lower receiver coils mounted in the coil assembly. The responses are recorded and displayed by an integrated data logger as two-channel information. The bottom channel is more sensitive to metallic objects in the shallow (upper few feet) subsurface, and the differential response is more sensitive to metal objects from 3 to 10 feet below ground surface. The EM-61 can detect a single 55-gallon drum at a depth of more than 10 feet beneath the instrument, yet it is relatively insensitive to interference from nearby surface metal such as fencing, buildings, and automobiles. The instrument is pulled along the ground surface by a single operator, and measurements are collected at desired intervals along the ground surface. The terrain at the site may limit the areas where the EM-61 survey can be completed.

Anomalies detected during the EM surveys will be marked on the ground and further investigated using ground penetrating radar (GPR).

4.3.2 *Ground Penetrating Radar Survey*

A ground penetrating radar (GPR) survey will be performed in the area of Captain's Cove where former building foundations are believed to be present. The GPR method is based upon the transmission of repetitive, radio-frequency electromagnetic (EM) pulses into the subsurface. When the transmitted energy of down-going wave contacts an interface of dissimilar electrical character, part of the energy is returned to the surface in the form of a reflected signal. This reflected signal is detected by a receiving transducer and is displayed on the screen of the GPR unit as well as being recorded on the internal hard-drive.

The received GPR response remains constant as long as the electrical contrast between media is present and constant. Lateral or vertical changes in the electrical properties of the subsurface result in equivalent changes in the GPR responses. The system records a continuous image of the subsurface by plotting two-way travel time of the reflected EM pulse versus distance traveled along the ground surface. Two-way travel time values are then converted to depth using known soil velocity functions. Each radar profile will be examined for characteristic GPR signatures that may indicate the presence of buried targets.

Following the geophysical survey, exploratory test pits may be conducted in the vicinity of anomalies in order to determine their origin. Test pits will follow the protocol in section 4.3, if performed.

4.4 Test Pits

Exploratory test pits will be performed in areas of identified GPR anomalies. In addition, several test pits will be performed on the Gladsky ERP site and Li Tungsten's Parcel A and B for infiltration tests required for construction purposes. Test pits will follow the soil excavation protocols established in the Glen Cove Ferry Terminal Site Management Plan (**Appendix B**). General procedures are detailed below.

4.4.1 *Test Pit Protocol*

At each location a backhoe or equivalent will be utilized to perform the test pit. Prior to the excavation, 10-mil polyethylene sheeting, sufficiently large to hold the anticipated excavated soil will be laid on the ground in the area where the excavated soil will be placed. Each test pit will be performed in two foot lifts and placed on the polyethylene sheeting in individual piles.

During excavation, each two foot lift will be characterized and screened for the following:

- Visual signs of staining or discoloration
    - o Soils with staining or discoloration will be segregated
- Volatile organic vapors utilizing a photo-ionization detector (PID)
    - o Soils with reading above established background levels will be segregated

- Metals utilizing a handheld XRF monitor
  - Arsenic levels above 24 mg/kg will be segregated
  - Lead levels above 400 mg/kg will be segregated
- Radiation screening utilizing a radiation rate meter/scale (In accordance with PWGC's Radiation Monitoring Plan (**Appendix C**))
  - Counts above two times established background will be segregated

A test pit log will be developed for each location. The log will include classification of soil, screening results, and photographs of each two foot lift.

In addition, infiltration tests will be performed at several of the test pit locations. Water utilized for infiltration tests will be from a potable water supply. The amount of water used for each test will be recorded.

4.4.2 *Backfill and Restoration*

Excavated materials that fail the screening criteria shall be transported to a designed staging area for subsequent testing and analysis for off-site disposal or on-site reuse. Materials are to be staged on top of and covered with polyethylene sheeting. Ten (10) mil thick sheeting shall be used to cover the top of stockpiles. Forty (40) mil thick sheeting shall be placed beneath potentially or known contaminated material to prevent contact with undisturbed or clean soil. Stockpiles must be constructed to isolate the contaminated material from the environment. Diversion measures must be employed to prevent storm water run-on and run-off to the stockpiles. Individual stockpiles of potentially contaminated soil shall not exceed a volume of 500 cubic yards.

Backfilling of test pits will be completed in accordance to the Captain's Cove Site Management Plan.

Off-Site Fill Material

1. Off-site fill must be uncontaminated pursuant to the remediation standards applicable to the Site. Off-site fill material to be used within the top two feet of final grade shall meet the requirements of NYSDEC Soil Cleanup Objectives (SCOs) for restricted residential land uses as defined in 6NYCRR Subpart 375.
2. Documentation of the quality of the off-site fill must be provided by a certification stating that it is clean material from a commercial or noncommercial source.
3. If documentation of the quality of the fill material cannot be provided, a backfill evaluation proposal, which identifies material characterization protocols, shall be submitted to and approved by the NYSDEC prior to the use of any backfill material.

On-Site Fill Material

1. On-site fill material may be reused for filling activities greater than two feet below final grade.
2. On-site fill material will be covered with a demarcation layer and two feet of clean soil meeting the requirements for off-site fill material described above.

4.5 Geotechnical Investigation

A geotechnical investigation is being performed to obtain information necessary to design and construct piles for support of the buildings, drainage considerations under the buildings, parking lot design, and infiltration characteristics for storm water control and storage devices. Geotechnical borings will be performed on the Li Tungsten's Parcel A and B only. Geotechnical borings are anticipated to extend to a depth of up to 100 feet below surface grade.

4.5.1 *Typical Geotechnical Protocol*

Prior to performing geotechnical borings, 10-mil polyethylene sheeting, sufficiently large to hold the anticipated number of soil cores will be laid on the ground in the area where the geotechnical borings will be performed.

Since impacts from historical operations have been documented in the soils above the water table interface, the drilling methods detailed below will be utilized to prevent migration of potential contaminants. The geotechnical borings will be installed by a mud rotary drilling rig. Each borehole will be advanced to a depth of twenty feet below land surface in two foot long increments. As the borehole is advanced a four inch interior diameter steel casing will be inserted into the borehole to prevent the shallow soils from falling into the borehole and mixing with the deeper soils. The borehole will only be screened to twenty feet below land surface as it is unlikely that the shallow contaminants will have migrated to that depth. If the monitoring shows that the contaminants have migrated deeper, the casing will be extended until the bottom of the contaminated zone is reached.

Continuous split spoon samples will be collected at 2-ft intervals ahead of the casing to a depth of twelve feet to allow for environmental confirmation/data gap sampling as detailed in section 4.5. Following the completion of environmental sampling additional samples will be collected from 15 to 17 feet and 20 to 22 feet for geotechnical evaluation.

The initial twenty feet of several geotechnical borings will be drilled first so that the mud can be changed when the part of the boring extending from twenty feet below land surface is advanced. The deeper part of the borehole will not be cased and will use clean mud so as not to drag any contaminants from the (still cased) shallower depths into the deeper zones. All of the mud used for the surface to twenty feet deep part of the boring will be removed, drummed, tested and disposed as required.

After each borehole has been completed to twenty feet and the existing mud has been removed and drummed, the driller will go back and continue drilling at each borehole to the anticipated finish depth utilizing new mud. Split spoon samples will then be collected at 5-ft intervals to the target depth. Drill cuttings, mud and water that are brought up to the surface will be containerized in 55-gallon drums.

Screening of the drill cuttings and split spoon samples will be performed as follows for soil collected within the first twenty feet:

- Visual signs of staining or discoloration
  - Soils with staining or discoloration will be segregated
- Volatile organic vapors utilizing a photo-ionization detector (PID)
  - Soils with reading above established background levels will be segregated
- Metals utilizing a handheld XRF monitor
  - Arsenic levels above 24 mg/kg will be segregated

- Lead levels above 400 mg/kg will be segregated
- Radiation screening utilizing a radiation rate meter/scale (See **Appendix C**)
  - Counts above two times established background will be segregated

The soil screening method above will be modified to only include volatile organic vapor screening after the boring reaches twenty feet below land surface since only VOC groundwater impacts have been documented at deeper depths and the shallow soils are effectively sealed off with the use of the outer casing. A soil boring log will be developed for each location for the first twenty feet. The log will include classification of soil, screening results, and photographs of each split spoon.

4.5.2 *Backfill and Restoration*

Following completion of each geotechnical boring, the borehole will be sealed with a cement / bentonite grout mixture to surface grade. Should borings disturbed an engineering control such as a demarcation barrier, the engineering control will be repaired.

4.6 Subsurface Soil Characterization

Previous investigations have identified several areas of the site which have not been investigated (Data Gap) and several areas of known contamination (Confirmation). In order to determine the quality of soil in these areas and in areas of phase I construction activities, soil borings will be installed as shown on **Figure 5**.

4.6.1 *Soil Boring Protocol*

Prior to performing soil borings, 10-mil polyethylene sheeting, sufficiently large to hold the anticipated number of soil cores will be laid on the ground in the area where the soil boring will be performed.

Soil borings will be installed utilizing a Geoprobe® direct-push drill rig outfitted with a dual-core sampler or closed piston sampler and dedicated acetate liners with the exception of the samples collected from the geotechnical boreholes, which will be collected with split spoon samplers. Soils will be collected continuously from ground surface to an approximate depth of twelve feet below post phase I construction surface grade (See **Appendix A** for grades) or to the water table. Each soil core will be characterized and screened for the following:

- Visual signs of staining or discoloration
  - Soils with staining or discoloration will be segregated
- Volatile organic vapors utilizing a photo-ionization detector (PID)
  - Soils with reading above established background levels will be segregated
- Metals utilizing a handheld XRF monitor
  - Arsenic levels above 24 mg/kg will be segregated
  - Lead levels above 400 mg/kg will be segregated
- Radiation screening utilizing a radiation rate meter/scale (See **Appendix C**)
  - Counts above two times established background will be segregated

A soil boring log will be developed for each location. The log will include classification of soil, screening results, and photographs of each core.

4.6.2 *Sampling Protocol*

Soil samples will be collected from three intervals from each soil boring to evaluate soil quality.

- Surface Interval: 0-2 feet below ground surface or below the vegetative layer.
- Shallow Interval: A two foot interval collected between 2 and 6 feet below ground surface. This interval will be biased towards elevated screening levels. If there are no elevated screening levels, the deeper of the two foot interval will be collected.
- Intermediate Interval: A two foot interval collected between 6 and 12 feet below ground surface. This interval will be biased towards elevated screening levels. If there are no elevated screening levels, the deeper of the two foot interval will be collected.

Soil samples will be analyzed for the following:

- Semi-Volatile Organic Compounds by USEPA Method 8270
- Pesticides by USEPA Method 8081
- TAL Metals by USEPA Method 6010/7471
- Volatile Organic Compounds by USEPA Method 8260 (Only to be collected were elevated PID responses are obtained)

As detailed in the Radiation Monitoring Plan and the Glen Cove Ferry Terminal Site Management Plan, soil intervals that exceed the radiation screening action level of two times background will be segregated and sampled. In addition, radiation confirmation sampling will be performed on a minimum of 5% of the total collected samples from intervals that do not exceed the radiation screening action level. Samples will be biased towards intervals with elevated radiation screening levels. If no elevated levels are observed, analyzed samples will be spread out evenly across the site to provide horizontal and vertical confirmation coverage. Samples will be analyzed by USEPA Method 901.1M which includes the following radioisotopes: K-40, Tl-208, Pb-212, Pb-214, Bi-212, Bi-214, Ra-226, Ra-228, Th-234, and U-235.

Should samples be collected for volatile organic analysis, samples will be collected directly from the acetate liners or split spoons utilizing tera-core sampling devices. The remaining sample volume will be transferred to a stainless steel bowl and homogenized. Once homogenized, samples will be transferred to laboratory supplied glassware and packed in a cooler with ice and shipped under proper chain-of-custody procedures to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory for analysis individually following NYSDEC Analytical Services Protocol (ASP) - Category B Deliverables. Non-disposable sampling equipment will be decontaminated prior to and in-between sampling with a laboratory grade detergent, tap water rinse, and distilled water rinse.

4.6.3 *Backfill and Restoration*

Soil intervals that fail the screening criteria shall be transported to a designed staging area for subsequent testing and analysis for off-site disposal or on-site reuse. Materials are to be transferred to 55-gallon drums, prior to disposal off-site.

At the completion of each soil boring, materials that are deemed acceptable for re-use will be returned to the bore hole in the order removed. Should borings disturbed an engineering control such as a demarcation barrier, the engineering control will be repaired.

4.7 Groundwater Characterization

Historical reports have identified the presence of groundwater contamination, likely from an up-gradient source, in the groundwater beneath the subject property. In order to verify current groundwater conditions at the subject site, groundwater sampling will be performed. Proposed groundwater sampling locations are identified on **Figure 5**.

Groundwater samples will be collected utilizing Geoprobe® technology. At each Geoprobe® groundwater sampling location, a four-foot long screen point sampler will be driven to the desired depth (three feet below the water table). This will allow the sampler screen to intersect the water table. At the desired depth, disposable polyethylene tubing will be inserted through the probe rods into the water bearing zone and connected to a peristaltic pump. In addition, one existing well (GM-11) will be sampled utilizing a submersible pump. Three to five casing volumes will be purged from the screen. After purging each well volume field measurements will be collected using portable field instruments. Turbidity, pH, temperature, and conductivity measurements will be collected. Groundwater samples will be collected after readings stabilize, but not before three casing volumes have been purged. Stabilization is considered achieved when consecutive readings within five percent of each other are collected between purge volumes. If turbidity cannot be reduced to 50 NTUs, but other parameters stabilize, samples will be collected. All monitoring well purging data will be recorded in a well sampling log.

Groundwater samples will be analyzed for the following:

- Volatile Organic Compounds by USEPA Method 8260
- Semi-Volatile Organic Compounds by USEPA Method 8270
- TAL Metals by USEPA Method 6010/7471 (Total and Dissolved)

Finally, 25% of samples will be analyzed for radiation confirmation. Groundwater samples will be containerized and submitted to a NYS ELAP certified laboratory for analysis individually following NYS ASP Category B protocol.

5.0 QUALITY ASSURANCE PROJECT PLAN

The Quality Assurance Project Plan (QAPP) developed in the Site Management Plans for the Li Tungsten Site and Captain's Cove Site prepared by Dvirka and Bartilucci will be followed with the modifications and additions detailed in the following sections. The QAPP is included in **Appendix D**.

5.1 Data Representativeness

Groundwater samples during this investigation will be collected from temporary groundwater sampling points rather than from permanent groundwater monitoring wells. Groundwater sampling details and protocols are detailed in section 4.5.

5.2 Decontamination Procedures

Non-disposable sampling equipment will be decontaminated following the procedures detailed in section 7.3.2 of the QAPP with the following modifications:

- Eliminate the methanol rinse
- Eliminate the second distilled water rinse

5.3 Laboratory Analysis

Requirements for sample analysis are described below. All samples will be submitted to a NYSDOH ELAP certified laboratory (to be determined) for analysis. Analytical methods, preservation, container requirements, and holding times are summarized below:

5.3.1 *Soil Samples*

Soil samples will be collected as described in Section 4.4. The soil sampling locations are shown in **Figure 5**. Soil samples will be submitted to a NYSDOH ELAP certified laboratory. Analysis will conform to NYSDEC ASP. Category B data deliverables will be submitted for all samples analyzed. Analytical methods, preservation, container requirements, and holding times are shown below.

ANALYTICAL METHODS
(SOIL)

Sample Matrix	Sample Type	Parameters	EPA Method	Sample Preservation	Holding Time	Sample Container
Soil	Grab	VOCs	8260C/5035 (High Level)	5ml MeOH Cool to 4°C	14 days	40 ml vials
Soil	Grab	VOCs	8260C/5035 (Low Level)	5ml Water Cool to 4°C	48 Hrs freeze 14 Days analysis	(2) 40 ml vials
Soil	Grab	SVOCs	8270	Cool to 4°C	14 days	4 oz. wide

						mouth glass
Soil	Grab	TAL Metals	6010	Cool to 4°C	6 months (28 days for Mercury)	4 oz. wide mouth glass
Soil	Grab	Pesticides	8081B	Cool to 4°C	14 Days (Extraction)	4 oz. wide mouth glass
Soil	Grab	Gamma Spec	901.1M	None	6 months	8 oz wide moth glass

5.3.2 *Groundwater Samples*

Groundwater samples will be collected as described in Section 4.5. The groundwater sampling locations are shown in **Figure 5**. Groundwater samples will be submitted to a NYSDOH ELAP certified laboratory. Analysis will conform to NYSDEC ASP. Category B data deliverables will be submitted for all samples analyzed. Analytical methods, preservation, container requirements, and holding times are shown below.

ANALYTICAL METHODS
(GROUNDWATER)

Sample Matrix	Sample Type	Parameters	EPA Method	Sample Preservation	Holding Time	Sample Container
Groundwater	Grab	VOCs	8260	HCL to pH <2.4 Cool to 4°C	14 days	(3) 40-mil vials
Groundwater	Grab	SVOCs	8270	Cool to 4°C	7 days	(2) 1 L amber glass jars.
Groundwater	Grab	TAL Metals	6010	HNO_3 to pH<2 Cool to 4°C	6 months (28 days for Mercury)	0.5 L Plastic.
Groundwater	Grab	Gamma Spec	901.1M	HNO_3 to pH<2 Cool to 4°C	6 months	2 liter plastic or glass

Estimated sample numbers are provided below.

ESTIMATED NUMBER OF SOIL AND GROUNDWATER SAMPLES

Sample Type	Estimated # of samples to be collected
Soil samples for SVOCs, Metals, and Pesticides	645
Soil samples for VOCs	0
Soil Samples for Radiological Confirmation	33
Groundwater samples for VOCs, SVOCs and Metals	19
Groundwater samples for Radiological Confirmation	5

Note: Does not include QC samples

5.4 Field/Laboratory Data Control Requirements

Quality Control (QC) procedures must be followed in the field and at the laboratory to ensure that reliable data are obtained. When performing this field sampling effort, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. QC samples to be collected in the field are provided below.

FIELD/LABORATORY QC REQUIREMENTS

Sample Type	Frequency	Purpose
Field Duplicate	One duplicate sample, or One per 20 samples of the same matrix.	To evaluate the precision of the field sampling and laboratory analyses.
Equipment Blank	One per type of sampling method used for each batch of sampling equipment. Equipment blanks are collected in the field using analyte-free water supplied by the laboratory.	To assess the cleanliness of the sampling equipment and the effectiveness of the decontamination process.
Trip Blank	One VOA (volatile organic analysis) trip blank per sample cooler that contains site samples to be analyzed for VOAs.	To detect VOC cross-contamination during sample shipping and handling. No trip blanks are anticipated because VOCs are not part of the proposed analytical analysis.
Method Blank	One per 20 samples of same matrix	To document contamination resulting from the analytical process.

Matrix Spike	One per 20 samples of same matrix	It is used to measure the efficiency of all steps of the sampling and analytical methods in recovering the target analytes from the sample. It is a sample spiked with known quantities of analytes and subjected to the entire analytical procedure.
Matrix Spike Duplicate	One per 20 samples of same matrix.	To reinforce the matrix spike information. It is a second aliquot of the same sample as the matrix spike.

5.5 Management of Investigation Derived Waste

Waste materials generated from the field operations may consist of test pit soils, soil cuttings, mud from geotechnical drilling, purge water, and miscellaneous solid materials such as personal protective equipment (PPE) and supplies. Investigative derived waste (IDW) generated during field operations will be disposed of in accordance with applicable regulations.

Test pit soils that fail the screening methods detailed in section 4.3.1 will be handled as described in section 4.3.2.

Mud generated from the geotechnical borings will be containerized in 55-gallon drums. Drums will be labeled to indicate the area of generation and will be stored in a designated area onsite. Drummed mud will be disposed of at an off-site disposal facility. Following receipt of the analytical results, recommendations for disposition of the drummed soil will be provided to the NYSDEC/EPA.

Soil cuttings generated from soil boring activities that fail the screening methods detailed in section 4.5.1 will be stored in 55-gallon drums. Drums will be labeled to indicate the source of the soil and will be stored in a designated area onsite. Drummed soils will be disposed of at an off-site disposal facility. Following receipt of the analytical results, recommendations for disposition of the drummed soil will be provided to the NYSDEC/EPA.

Development and purge water generated during the field activities will be stored in a portable holding tank and/or 55-gallon drums. Drums will be labeled to indicate the source of the fluid and will be stored in a designated area onsite. Drummed groundwater will be sampled to determine if discharge to the surface of the site is appropriate or off-site disposal is required. Following receipt of the groundwater sampling results, recommendations for disposition of the water will be provided to NYSDEC/EPA.

6.0 INVESTIGATION REPORT PREPARATION

The Investigation Report (IR) will incorporate the methods and findings of the investigation activities performed as outlined in this work plan. The report will identify specific contamination concentrations throughout each media (e.g. soil, groundwater, etc) and provide conclusions and recommendations for additional investigation and/or remedial action.

7.0 HEALTH AND SAFETY

Field operations will be performed in accordance with the health and safety requirements provided in the site specific Health and Safety Plan (HASP) prepared by Posillico Environmental (October 2012). The HASP is included as **Appendix E**. The HASP outlines the requirements for training, medical surveillance, daily tailgate meetings, emergency response, and accident and injury reporting. The HASP will be followed with the following modifications:

- Section 6.2 Personal Air Monitoring
    - Personal Air Monitoring will not be performed during the investigation due to the nature of the investigation and minimal disturbance to the soils at the site.

8.0 COMMUNITY AIR MONITORING PLAN

This Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in excavation work) from potential airborne contaminant releases resulting from excavation activities. Action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the work did not spread contamination off-site through the air.

The primary air monitoring concerns for this site are VOCs and dust particulates.

8.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.
- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan: This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air.
- NYSDEC Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

8.2 Air Monitoring

The following sections contain information describing the types, frequency and location of real-time monitoring.

8.2.1 *Real-Time Monitoring*

This section addresses the real-time monitoring conducted within the work area, and along the work perimeter, during intrusive activities.

8.2.1.1 Work Area

The following instruments shall be used for work area monitoring:

- PID
- Dust Monitor

Table 2-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 2-2 lists the Real-Time Air Monitoring Action Levels to be used in work areas.

8.2.1.1 Community Air Monitoring Requirements

To establish ambient air background concentrations, air quality monitoring shall be performed at several locations around the perimeter of the excavation before activities begin. Air monitoring shall be continued periodically in series during work activities.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent. Air will be monitored for VOCs with a portable Photovac MicroTip PID, or equivalent. Table 2-1 presents a breakdown of each main activity and provides the instrumentation, frequency and location of the real-time monitoring for the site. Table 2-2 lists the Real-Time Air Monitoring Action Levels to be used in work areas. Air monitoring data shall be documented in a site log book by the designated site safety officer. The site safety officer or delegate shall calibrate and maintain air monitoring instruments in accordance with manufacturer's specifications. Instruments shall be zeroed daily and checked for accuracy and a daily log shall be kept. If additional air monitoring is required, protocols shall be appended to this plan.

TABLE 2-1

FREQUENCY AND LOCATION OF AIR MONITORING

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Excavation	PID, Dust Monitor	Continuous in Breathing Zone (BZ) and downwind work area perimeter during intrusive activities or if odors become apparent. Screening upon arrival at excavation locations, screening in the BZ during excavation and downwind work area perimeter every 30 minutes during non-intrusive activities

TABLE 2-2

REAL_TIME AIR MONITORING ACTION LEVELS

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	0-25 ppm, non-transient	None	Exposure below established exposure limits
PID	Breathing Zone	25-100 ppm, non-transient	Don Air-Purifying Respirator (APR)	Based on potential exposure to VOCs
PID	Breathing Zone	>100 ppm, non-transient	Don Air-Supplied Respirator (ASR) or Self-Contained Breathing Apparatus (SCBA), Institute vapor/odor suppression measures, Notify Health & Safety Manager (HSM).	Increased exposure to site contaminants, potential for vapor release to public areas.
PID	Work Area Perimeter	< 5 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter	> 5 ppm	Stop work and implement vapor release response plan until readings return to acceptable levels, Notify HSM.	Increased exposure to site contaminants, potential for vapor release to public areas
Aerosol Monitor	Work Area Perimeter	>100 but < 150 µg/m³ for 15 minutes	Institute dust suppression measures, Notify HSM.	Work to continue if particulate concentrations remain below 150 µg/m³
Aerosol Monitor	Work Area Perimeter	>150 µg/m³	Don ASR or SCBA, Institute dust suppression measures, Notify HSM.	Stop work until readings return to acceptable levels,

8.3 Vapor Emission Response Plan

This section is excerpted from the NYSDOH guidance for Community Air Monitoring Plan - Ground Intrusive Activities.

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities shall be halted and monitoring continued. Vapor suppression measures can also be taken at this time. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- Organic vapor levels 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If organic vapor levels exceed 25 ppm at the perimeter of the work area, work activities shall be halted. When work is halted, downwind air monitoring as directed by the Site Health & Safety Officer (SHSO) shall be implemented to determine whether vapor emission may impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan Section.

8.4 Major Vapor Emission Response Plan

If organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, work activities shall be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality shall be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source (see Section 5.0) are unsuccessful and if organic vapor levels are approaching 5 ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect.

However, the Major Vapor Emission Response Plan shall be immediately placed in effect if organic vapor levels are greater than 10 ppm above background.

Upon activation, the following activities shall be undertaken:

1. Emergency Response Contacts, as identified in the Health & Safety Plan, shall go into effect.
2. The local police authorities shall be contacted immediately by the Health & Safety Officer (HSO) and advised of the situation.
3. Frequent air monitoring shall be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSO.

8.5 Data Quality Assurance

8.5.1 *Calibration*

Instrument calibration shall be documented in the designated field logbook. Instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

8.5.2 *Operations*

Instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment shall be maintained on-site by the Field Operations Leader (FOL)/HSO for reference.

8.5.3 *Data Review*

The Field Team Leader FOL/HSO shall interpret monitoring data based on Table 2-2 and his/her professional judgment. The FOL/HSO shall review the data with the HSM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

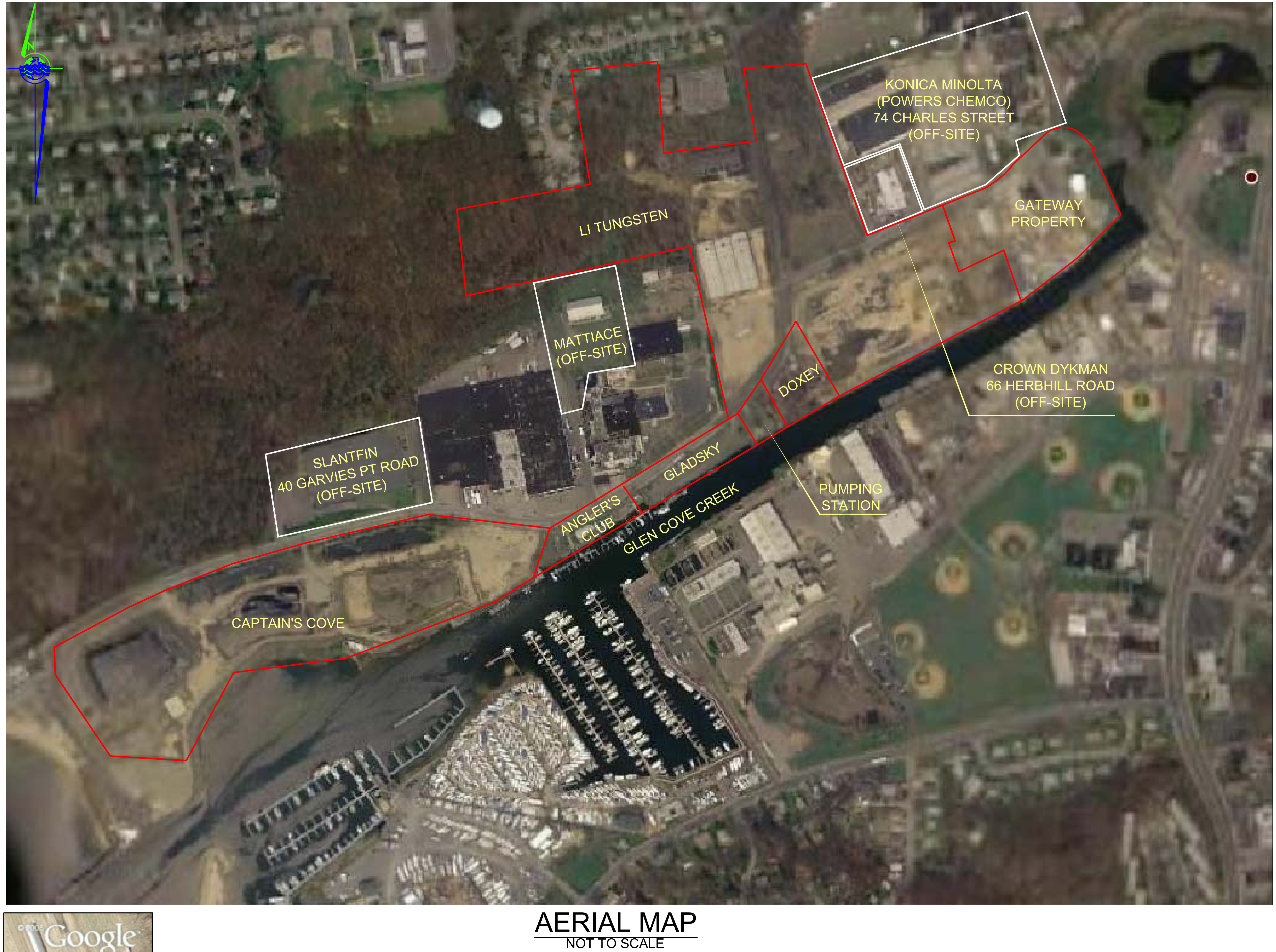
Monitoring and sampling data, along with sample documentation shall be periodically reviewed by the HSM.

8.6 Records and Reporting

Readings shall be recorded and available for review by personnel from NYSDEC and NYSDOH. Should any of the action levels be exceeded, the NYSDEC Division of Air Resources shall be notified in writing within five (5) working days.

The notification shall include a description of the control measures implemented to prevent further exceedances.

FIGURES



AERIAL MAP
NOT TO SCALE

PWGC
Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE
PARTNERS, LLC

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT:	RRL0801	APPROVED BY:	LS
DESIGNED BY:	ZY	DATE:	12/11/08
DRAWN BY:	LLG	SCALE:	AS SHOWN

SHEET TITLE

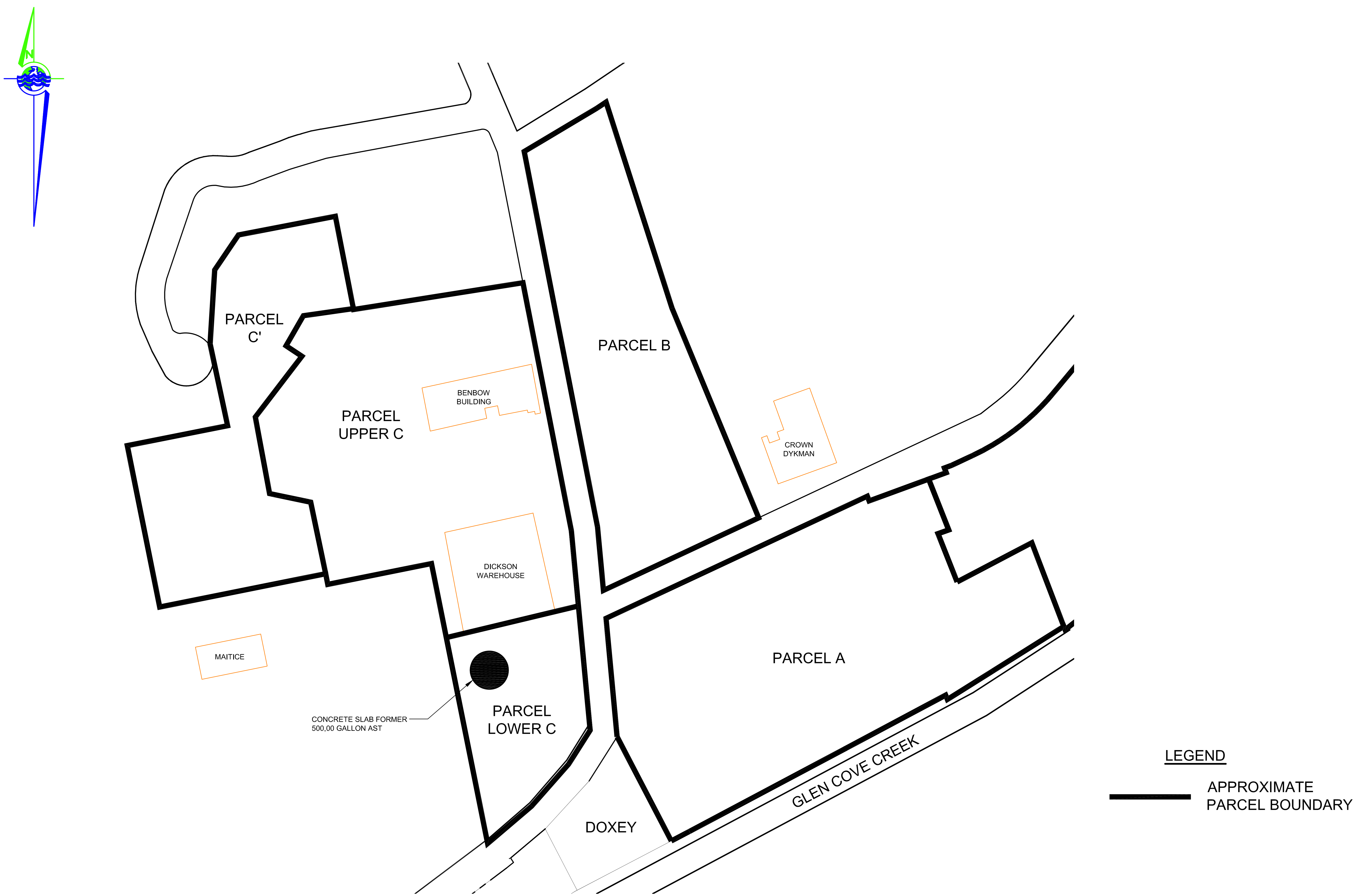
SUBJECT PROPERTY
LOCATION MAP

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 1

SHEET 1 OF 14

J:\Projects M-R\RGI\0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 1.dwg



LI TUNGSTEN PARCELS

SCALE: ~1" = 200'

0 200 400
SCALE: ~1" = 200'

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 2 Litungsten parcels.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE
PARTNERS, LLC

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT:	RGI0801	APPROVED BY:	LS
DESIGNED BY:	BB	DATE:	12/5/08
DRAWN BY:	LLG	SCALE:	AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCELS

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 2

SHEET 2 OF 14

2003 GLEN ISLE VERIFICATION SAMPLING RESULTS

Parcel A Metals and Semivolatile Organic Compounds Sampling Results

Sample ID	PA1	PA2	PA3	PA4	PA4A	PA5	PA6	PA8	PA9	PA11	PA12	PA20	PA21	PA22	PA23	PA24	PA25	PA29	PA32	PA33	PA37	TAGM Values	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1			
Semivolatile Organics (ug/Kg)																								
Benzo (a) anthracene	**1110**	**2170**	112	**1860**	39	154	228	**1960**	376	415	U	479	606	320	728	348	305	**3030**	97	47	364	224	1000	1000
Chrysene	1190	2320	136	2080	31	213	260	2200	505	535	U	562	674	402	935	420	U	3320	101	64	432	400	1000	3900
Benzo (a) pyrene	**1220**	**1980**	126	**1950**	34	123	226	**1970**	483	540	U	490	663	332	832	398	329	**2730**	102	104	443	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	256	U	U	56	**332**	U	U	U	U	U	75	U	U	70	U	U	U	U	14	330	330
Total SVOC's	3520	6470	126	6146	406	123	510	6462	1364	1490	U	1531	1943	1129	2495	1165	704	9080	102	104	1239	500,000		
Metals (mg/Kg)																								
Arsenic	4.85	5.53	7.48	7.85	7.78	8.85	3.38	4.22	2.64	3.75	**136**	2.96	3.08	3.73	2.37	2.88	4.38	8.55	**50.8**	12	3.03	7.5	13	16
Mercury	0.28	0.03	0.39	0.2	0.38	0.049	0.068	0.12	0.12	0.081	0.045	0.095	0.091	0.068	0.1	0.078	0.19	0.29	0.07	0.095	0.063	0.1	0.18	0.81
Depth (ft)	3-3.5	4-5	1.5-5	1.5-5	4-4.5	4-5	3-4	1.5-5	2-3	4-5	3-3.5	1.5-5	4-5	4.5-5.5	1.5-5	5-5.5	4-5	2-3	1.5-5	1.5-5	4-5			
Semivolatile Organics (ug/Kg)																								
Benzo (a) anthracene	**7510**	79	330	NS	55	47	102	NS	160	112	939	NS	72	U	NS	NS	234	81	NS	NS	U	224	1000	1000
Chrysene	**8420**	79	549	NS	71	68.6	101	NS	211	120	2550	NS	116	U	NS	NS	302	116	NS	NS	U	400	1000	3900
Benzo (a) pyrene	**7430**	72	295	NS	44	30.5	76	NS	167	118	**1220**	NS	64	U	NS	NS	275	U	NS	NS	U	61	1000	1000
Dibenzo (a,h) anthracene	**1210**	U	88	NS	U	U	U	NS	U	U	U	NS	U	U	NS	NS	56	U	NS	NS	U	14	330	330
Total SVOC's	24570	72	1262	NS	618	511	U	NS	167	118	4709	NS	64	U	NS	NS	565	968	NS	NS	U	500,000		
Metals (mg/Kg)																								
Arsenic	**40.3**	6.18	**295**	NS	14.6	3.95	**77.3**	NS	4.27	**46.3**	**368**	NS	**32.5**	9.93	NS	**49.1**	4.61	6.09	NS	NS	10.6	7.5	13	16
Lead	103	2.87	216	NS	28.9	19.6	56.1	NS	34.7	**482**	3.34	NS	315	24.3	NS	200	121	44.5	NS	NS	14.7	400	63	400
Mercury	**0.33**	0.015	0.092	NS	0.039	0.053	0.09	NS	0.063	0.38	U	NS	0.084	0.081	NS	**1.91**	0.27	0.085	NS	NS	0.15	0.1	0.18	0.81
Depth (ft)	7-8	6-7	5-8	5-8	8-9	5-8	5-8	6-7	6-7	6-7	6-7	5-6	5-8	5-8	5-5.5	7-7.5	7-8	7-8	5.5-6.5	5-6	5-8			
Semivolatile Organics (ug/Kg)																								
Benzo (a) anthracene	U	139	NS	NS	NS	NS	NS	U	U	U	U	423	NS	NS	991	**2000**	U	U	96	U	U	224	1000	1000
Chrysene	U	157	NS	NS	NS	NS	NS	U	U	U	U	583	NS	NS	1190	**2250**	U	U	129	U	U	400	1000	3900
Benzo (a) pyrene	U	U	NS	NS	NS	NS	NS	U	U	U	U	425	NS	NS	970	**2170**	U	U	89	U	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	NS	NS	NS	NS	NS	U	U	U	U	86	NS	NS	164	**389**	U	U	U	U	U	14	330	330
Total SVOC's	U	1,842	NS	NS	NS	NS	NS	U	U	U	U	1517	NS	NS	3315	6809	U	U	89	U	U	500,000		
Metals (mg/Kg)																								
Arsenic	0.41	7.02	NS	NS	7.29	NS	NS	U	4.84	**19.9**	**56.5**	**32.6**	NS	NS	2.65	0.51	0.71	U	8.34	8.91	NS	7.5	13	16
Mercury	U	0.037	NS	NS	**4.53**	NS	NS	0.039	0.044	0.027	U	0.5	NS	NS	0.13	0.036	0.03	0.014	0.16	0.2	NS	0.1	0.18	0.81
Depth (ft)	>8	10-11	>8	>8	9-10	9-10	9.5-10	8-9	>8	>8	>8	8-9	8-9	11-12	9-10	>8	>8	>8	>8	9-10	>8			
Semivolatile Organics (ug/Kg)																								
Benzo (a) anthracene	NS	U	U	NS	747	U	U	**2020**	NS	NS	NS	U	U	U		U	NS	NS	NS	U	NS	224	1000	1000
Chrysene	NS	U	U	NS	913	U	U	2370	NS	NS	NS	U	U	U	U	U	NS	NS	NS	U	NS	400	1000	3900
Benzo (a) pyrene	NS	U	U	NS	729	U	U	**1960**	NS	NS	NS	U	U	U	U	U	NS	NS	NS	U	NS	61	1000	1000
Dibenzo (a,h) anthracene	NS	U	U	NS	U	U	U	U	NS	NS	NS	U	U	U	U	U	NS	NS	NS	U	NS	14	330	330
Total SVOC's	NS	U	U	NS	2384	U	U	6350	NS	NS	NS	U	U	U		U	NS	NS	NS	U	NS	500,000		
Metals (mg/Kg)																								
Arsenic	NS	**26.5**	9.89	NS	1.76	1.48	0.86	**37**	NS	NS	NS	1.82	1.35	U	0.58	NS	NS	NS	NS	U	NS	7.5	13	16
Mercury	NS	0.0062	0.024	NS	0.027	0.023	0.015	**2.74**	NS	NS	NS	0.044	0.23	0.0059	0.014	NS	NS	NS	NS	0.015	NS	0.1	0.18	0.81

Notes:
U = Below Detection Limit
NS = Not Sampled
Results oained from *"Geln Isle Field Verification Program Certification Sampling Event #1"* October-November 2003
Exceeds TAGM Cleanup Objective
Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective

2000 EPA ENDPOINT SAMPLING RESULTS

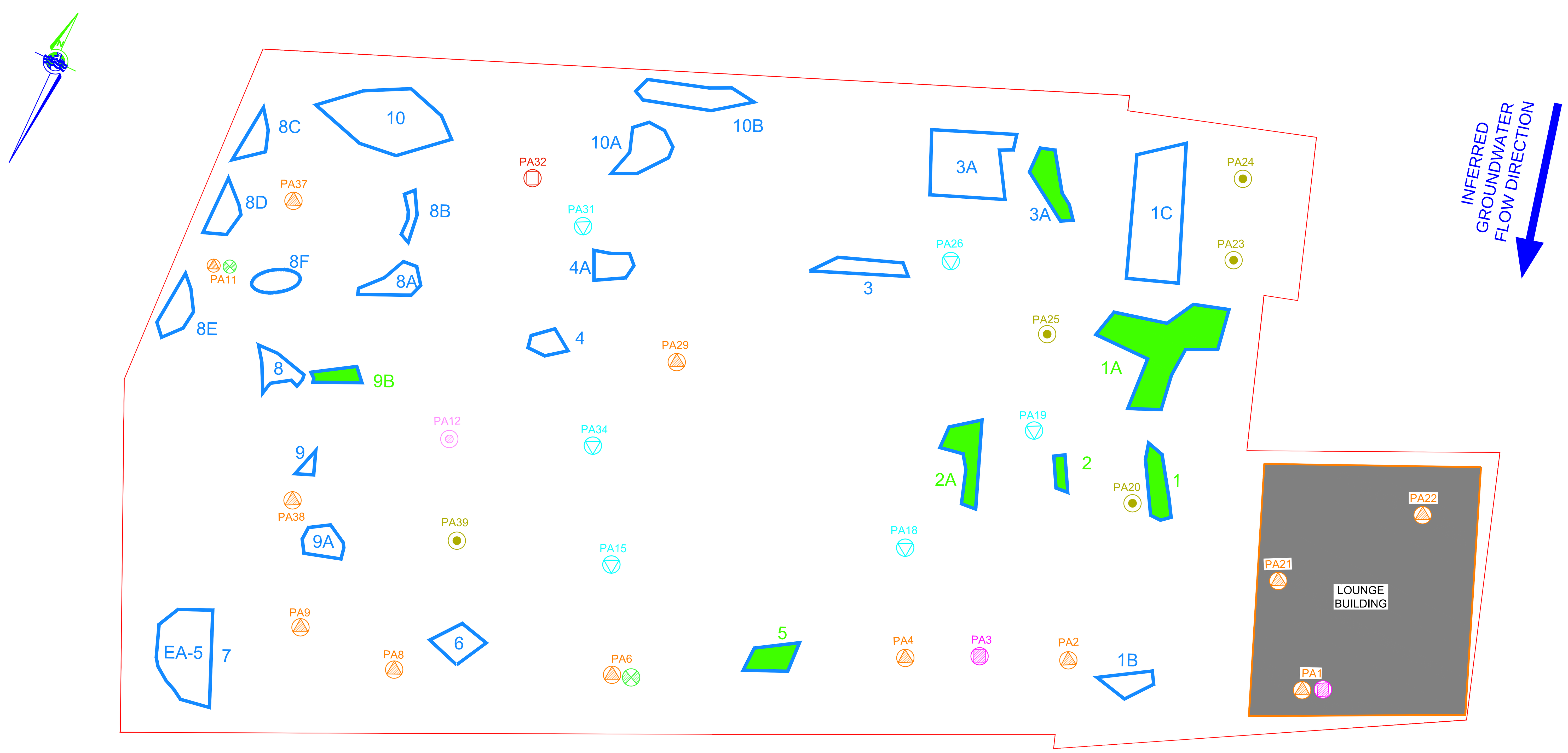
Parcel A Excavation Areas Confirmatory Composite Sampling Results

Excavation Areas	Arsenic (mg/Kg)	Lead (mg/Kg)	Radium 226 (pCi/g)	Thorium 232 (p/Ci/g)
1	**51**	160	1.4	3.54
1a	**26**	200	1.48	3.16
1b	NS	NS	1.07	4.54
1c	NS	NS	0.96	3.33
2	**24**	68	0.92	2.32
2a	**41**	25	1	2.68
3	12	160	1.62	3.57
3a	**28**	180	1.12	1.29
4	NS	NS	1.12	1.29
4a	NS	NS	0.89	4.85
5	**580**	100	0.533	1.12
6	NS	NS	1.42	1.74
7	**20**	61	1.2	**5.9***
8 (sub areas a - f)	13	43	0.8	1.52
9	NS	NS	1	1
9a	1.4	28	1	3.1
9b	**110**	190	1	3.1
10	2.1	28	0.9	1.95
10a	NS	NS	0.6	2.48
10b	NS	NS	0.8	4.35
41	NS	NS	0.9	1.2
42	NS	NS	0.9	1.2

Notes:
Exceeds SWCLS
Lead: 400 mg/Kg
Arsenic: 24 mg/Kg
Radium 226 5pCi/g > backgroud
Thorium 232 5pCi/g > background
Background radiation levels are 1 pCi/g
Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective
Lead: 400 mg/Kg
Arsenic: 16 mg/Kg
* Area 7 could not be furthur excavated due to intrusion of water. This excavation was greater than 8 feet below grade (Re-excavated as part of the exempt area remediation)
Results obtained from *"Remedial Action Report For Operable Unit One (Li Tungsten Facility)"* September 2008

EA-5	Test Pits on Parcel A SW corner adjacent to Doxey property	6 - 12 feet	<1	<1	<1

Notes:
All sample data generated from composites collected from floors and walls of excavations
Results obtained from *"Remedial Action Report For Operable Unit One (Li Tungsten Facility)"* September 2008



LI TUNGSTEN PARCEL A
SCALE: ~1" = 50'

USEPA REMEDIAL ACTION FOR OUI RESULTS
APPROXIMATE EXCAVATION AREAS
EXCEEDANCE OF SWCL - ARSENIC

GLEN ISLE FIELD VERIFICATION PROGRAM RESULTS:
ELEVATED SURFACE SVOC
ELEVATED SUB-SURFACE SVOC
ELEVATED SURFACE METALS
ELEVATED SUB-SURFACE METALS
ELEVATED SUB-SURFACE METALS, SVOC
ELEVATED SURFACE & SUB-SURFACE SVOC
ELEVATED SURFACE & SUB-SURFACE METALS

0 50 100
SCALE: ~1" = 50'

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/22/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCEL "A"

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 2A

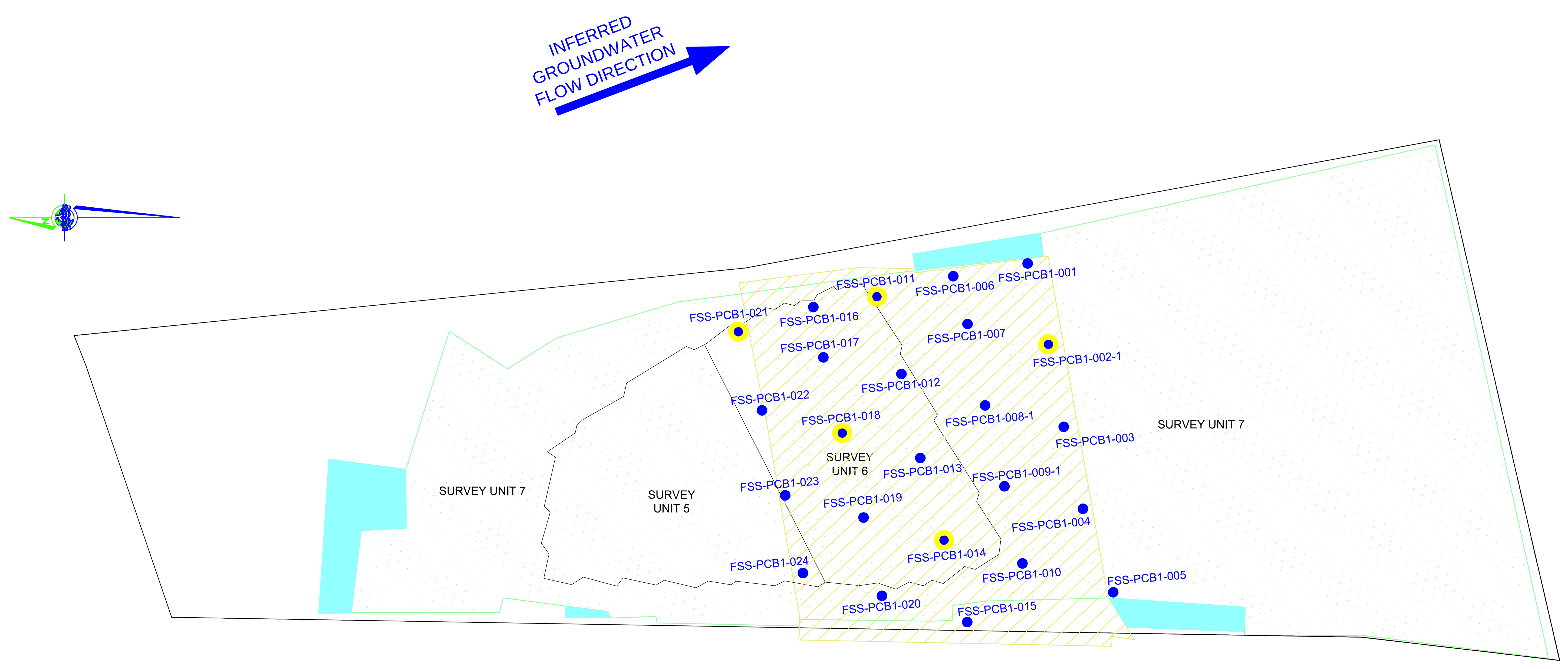
SHEET 3 OF 14

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DEGEIS ENV SEction\cad\Fig 2A 2-5-09.dwg

2007 EPA ENDPOINT SAMPLING RESULTS

PCB Sample Results	
Sample ID	PCB's (mg/Kg)
FSS-PCB1-001	0.93
FSS-PCB1-0020-1	1.528
FSS-PCB1-003	1.416
FSS-PCB1-004	0.184
FSS-PCB1-005	0.711
FSS-PCB1-006	0.792
FSS-PCB1-007-1	0.693
FSS-PCB1-008-1	0.774
FSS-PCB1-009-1	0.876
FSS-PCB1-010	0.72
FSS-PCB1-011	3.18
FSS-PCB1-012	0.765
FSS-PCB1-013	0.693
FSS-PCB1-014	3.22
FSS-PCB1-015	0.684
FSS-PCB1-016	0.996
FSS-PCB1-017	0.684
FSS-PCB1-018	1.668
FSS-PCB1-019	0.754
FSS-PCB1-020	0.702
FSS-PCB1-021	1.824
FSS-PCB1-022	0.742
FSS-PCB1-023	0.858
FSS-PCB1-024	0.648

Notes:
Exceeds 1 mg/Kg
Results obtained from *"Draft Final Survey Report"* September 2008



LI TUNGSTEN PARCEL B

SCALE: ~1" = 50'

DRAFT FINAL STATUS SURVEY RESULTS

- SITE BOUNDARY
- AREAS IDENTIFIED IN THE FINAL REMEDIAL DESIGN THAT DID NOT WARRANT REMEDIATION
- METALS AREA, EXCAVATION CUT LINES
- LAND AREA EXCAVATED AND SAMPLED FOR PCBs
- FSS-PCB1-016 — PCB ENDPOINT SAMPLE APPROXIMATE LOCATION
- FSS-PCB1-021 — PCB ENDPOINT SAMPLE EXCEEDING 1 mg/Kg

0 50 100
SCALE: ~1" = 50'

INFORMATION PROVIDED BY:
ECC 1746 COLE BLVD.
BUILDING 21, SUITE 350
LAKEWOOD, CO 80401

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DEGEIS ENV SEction\cad\Fig 2B.1.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/21/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCEL
"B"
PCB AREA ENDPOINT
SAMPLE LOCATIONS

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

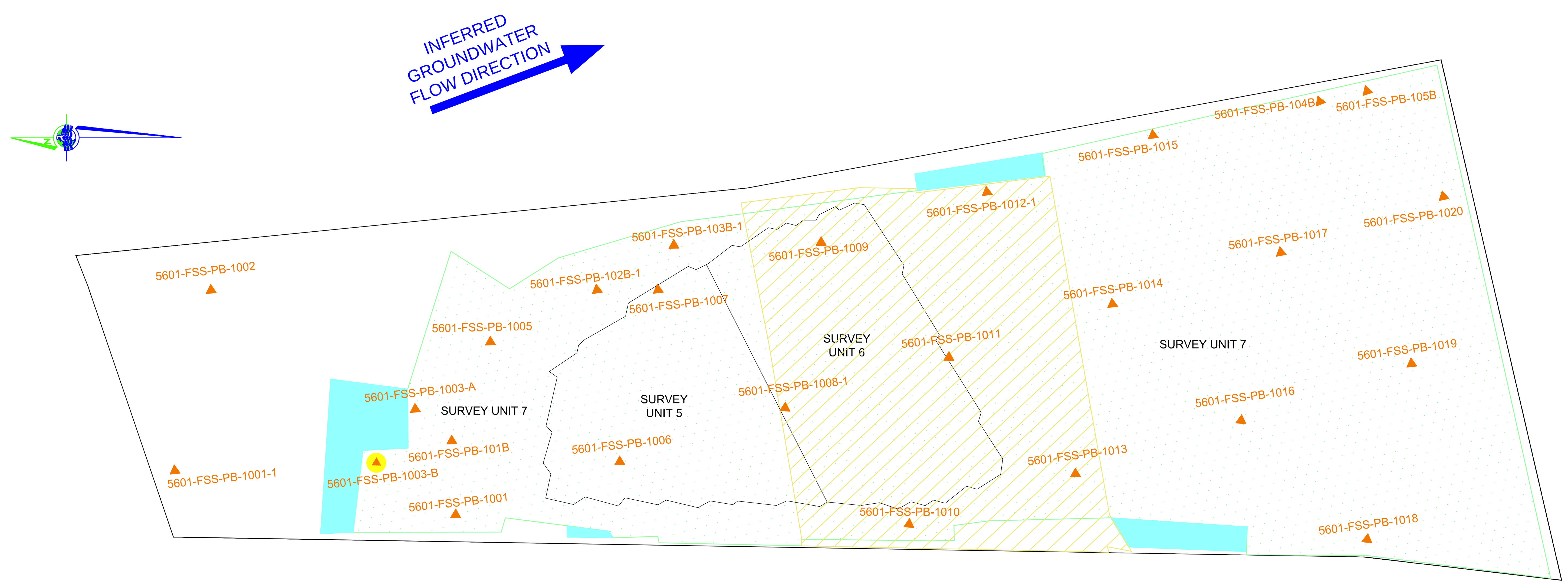
FIGURE NO
2B.1

SHEET 4 OF 14

2007 EPA ENDPOINT SAMPLING RESULTS

Metals Sample Results		
Sample ID	Pb (mg/Kg)	As (mg/Kg)
5601-FSS-PB-1001-1	119	6.4
5601-FSS-PB-1002	88.2	***15.3***
5601-FSS-PB-1003-A	173	***23.3***
5601-FSS-PB-1003-B	221	**68**
5601-FSS-PB-1004	13.1	4
5601-FSS-PB-1005	9.2	3.3
5601-FSS-PB-1006	40.2	8.8
5601-FSS-PB-1007	13.5	6.2
5601-FSS-PB-1008-1	54.9	6.9
5601-FSS-PB-1009	9.3	5.6
5601-FSS-PB-1010	30.2	5.1
5601-FSS-PB-1011	8.4	1.4
5601-FSS-PB-1012-1	7	6.1
5601-FSS-PB-1013	13.8	4.6
5601-FSS-PB-1014	8.5	2.2
5601-FSS-PB-1015	6.8	0.95
5601-FSS-PB-1016	14.7	7.4
5601-FSS-PB-1017	4.7	3.5
5601-FSS-PB-1018	9.5	2.8
5601-FSS-PB-1019	9.1	3.9
5601-FSS-PB-1020	25.9	4.3

Notes:
Exceeds SWCLS
Exceeds NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Results obtained from *"Draft Final Survey Report"* September 2008



LI TUNGSTEN PARCEL B
SCALE: ~1" = 50'

DRAFT FINAL STATUS SURVEY RESULTS

- SITE BOUNDARY
- AREAS IDENTIFIED IN THE FINAL REMEDIAL DESIGN THAT DID NOT WARRANT REMEDIATION
- METALS AREA, EXCAVATION CUT LINES
- LAND AREA EXCAVATED AND SAMPLED FOR PCBs
- 5601-FSS-PB-1015 — METALS ENDPOINT SAMPLE APPROXIMATE LOCATION
- 5601-FSS-PB-1003-B — METALS ENDPOINT SAMPLE EXCEEDING SWCL - ARSENIC

0 50 100
SCALE: ~1" = 50'

INFORMATION PROVIDED BY:
ECC 1746 COLE BLVD.
BUILDING 21, SUITE 350
LAKEWOOD, CO 80401

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DEGEIS ENV Section\cad\Fig 2B.2.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR
RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/21/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCEL "B"
METALS AREA FINAL SAMPLE LOCATIONS

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

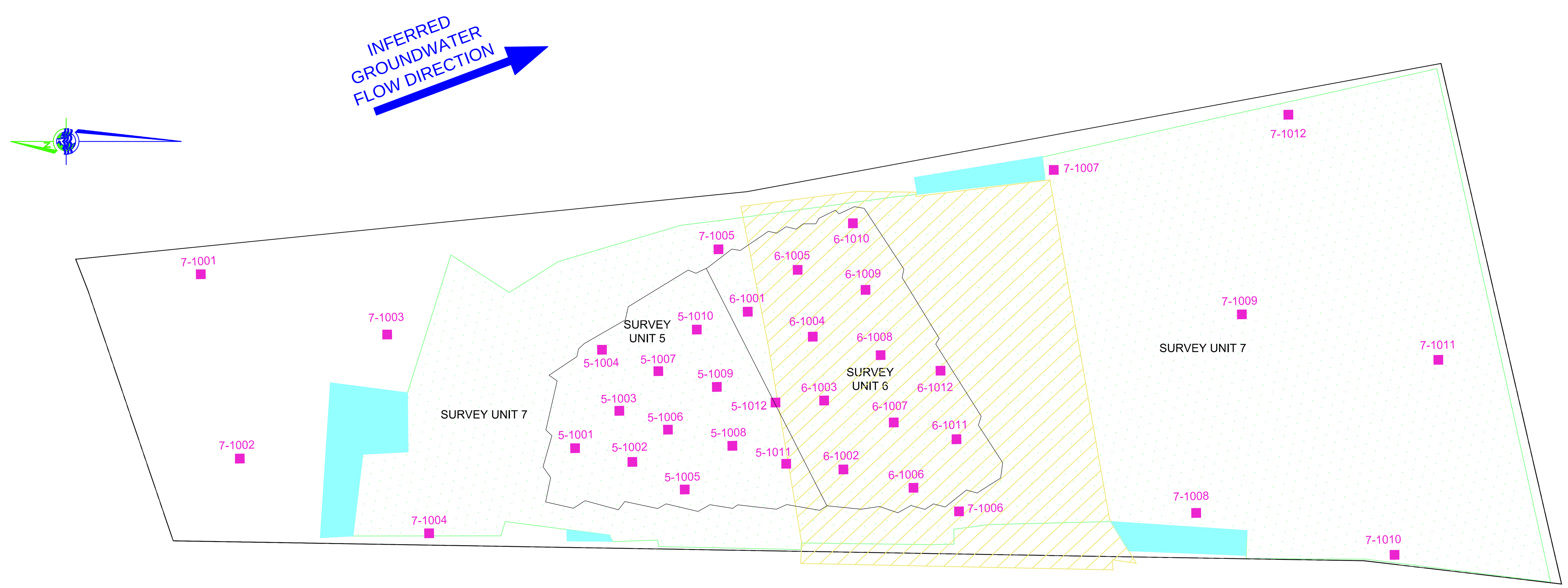
FIGURE NO 2B.2

SHEET 5 OF 14

2007 EPA ENDPOINT SAMPLING RESULTS

Radiological Survey Results				
Sample ID	Ra-226 (pCi/g)	Ra-228 (pCi/g)	Th-230 (pCi/g)	Th-232 (pCi/g)
5601-FSS-SU5-1001	0.87	0.42	0.82	0.98
5601-FSS-SU5-1002	0.99	0.31	0.84	1.02
5601-FSS-SU5-1003	0.81	0.40	0.61	0.80
5601-FSS-SU5-1004	0.73	0.52	0.79	0.92
5601-FSS-SU5-1005	1.30	0.65	1.01	1.17
5601-FSS-SU5-1006	0.11	-0.33	0.87	0.74
5601-FSS-SU5-1007	0.78	1.00	0.61	0.72
5601-FSS-SU5-1008	0.49	0.08	0.85	0.91
5601-FSS-SU5-1009	0.04	-0.10	0.89	0.91
5601-FSS-SU5-1010	1.04	0.73	0.63	0.75
5601-FSS-SU5-1011	0.74	0.61	0.40	0.48
5601-FSS-SU5-1012	1.40	0.92	0.60	0.63
5601-FSS-SU6-1001	0.94	0.76	0.50	1.04
5601-FSS-SU6-1002	0.47	0.60	0.53	0.81
5601-FSS-SU6-1003	0.54	0.59	0.45	0.56
5601-FSS-SU6-1004	0.80	1.21	0.85	1.09
5601-FSS-SU6-1005	1.23	1.25	0.99	1.05
5601-FSS-SU6-1006	0.59	0.86	0.80	0.97
5601-FSS-SU6-1007	0.75	0.83	0.77	1.02
5601-FSS-SU6-1008	0.19	0.50	0.58	0.66
5601-FSS-SU6-1009	0.95	1.00	0.63	0.72
5601-FSS-SU6-1010	0.63	0.82	0.63	0.94
5601-FSS-SU6-1011	0.63	0.65	0.49	0.78
5601-FSS-SU6-1012	0.76	0.88	0.67	0.68
5601-FSS-SU7-1001	0.90	0.99	0.86	0.89
5601-FSS-SU7-1002	1.08	0.99	0.70	0.76
5601-FSS-SU7-1003	1.21	0.76	0.92	1.08
5601-FSS-SU7-1004	1.12	1.00	0.89	1.00
5601-FSS-SU7-1005	1.31	0.51	0.67	0.67
5601-FSS-SU7-1006	1.02	0.33	0.76	1.10
5601-FSS-SU7-1007	0.46	0.32	0.36	0.35
5601-FSS-SU7-1008	1.21	1.23	0.60	0.65
5601-FSS-SU7-1009	1.08	1.15	0.82	1.04
5601-FSS-SU7-1010	1.01	0.74	0.73	0.89
5601-FSS-SU7-1011	0.97	0.81	0.78	1.03
5601-FSS-SU7-1012	0.44	0.56	0.56	0.50
5601-FSS-SU7-1019	1.01	0.99	0.76	0.84
5601-FSS-SU7-1020	1.04	0.79	0.87	1.06

Results obtained from *"Draft Final Status Survey Report"* September 2008



LI TUNGSTEN PARCEL B

SCALE: ~1" = 50'

DRAFT FINAL STATUS SURVEY RESULTS

- SITE BOUNDARY
- AREAS IDENTIFIED IN THE FINAL REMEDIAL DESIGN THAT DID NOT WARRANT REMEDIATION
- METALS AREA, EXCAVATION CUT LINES
- LAND AREA EXCAVATED AND SAMPLED FOR PCBs
- 7-1001 ENDPOINT SAMPLE APPROIXMATE LOCATION

0 50 100
SCALE: ~1" = 50'

INFORMATION PROVIDED BY:
ECC 1746 COLE BLVD.
BUILDING 21, SUITE 350
LAKEWOOD, CO 80401

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DEGEIS ENV SEction\cad\Fig 2B.3.dwg

PWGC
Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/21/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCEL "B"
RADIOLOGICAL SURVEY UNIT FINAL SAMPLE LOCATIONS

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 2B.3

2006 & 2007 EPA ENDPOINT SAMPLING RESULTS

Parcel C Metals Sample Results		
Sample ID	Pb (mg/Kg)	As (mg/Kg)
5601-FSS-PC-1001	72.3	2.3
5601-FSS-PC-1002	90	5.3
5601-FSS-PC-1003	22.6	1.6
5601-FSS-PC-1004	44.2	*18*
5601-FSS-PC-1005	94.6	11.7
5601-FSS-PC-1006	2.9	1.1
5601-FSS-PC-1007	15.3	7.5
5601-FSS-PC-1008	4.4	7.3
5601-FSS-PC-1009	13.5	6.4
5601-FSS-PC-1010	51.7	3.8
5601-FSS-PC-1011	21.4	8.5
5601-FSS-PC-1012-1	10.1	4
5601-FSS-PC-1013-1	5.4	1.1
5601-FSS-PC-1014	19.9	5.6
5601-FSS-PC-1015	16.2	2
5601-FSS-PC-1016	29.4	2.4
5601-FSS-PC-1017	23.5	3.6
5601-FSS-PC-1018	7	2.7
5601-FSS-PC-1019	14.4	1.2
5601-FSS-PC-1020	22	6.9
5601-FSS-PC-1021	9.9	10.3
5601-FSS-PC-1022	277	13.2
5601-FSS-PC-1023	92.5	7.3
5601-FSS-PC-1024	50.5	5.2
5601-FSS-PC-1025	4.3	1.2
5601-FSS-PC-1026	88.2	**68.2**
5601-FSS-PC-1027-1	42.1	7.2
5601-FSS-PC-1028	3.1	1.8
5601-FSS-PC-1029-1	93.8	9.5
5601-FSS-PC-1030	36	4.9
5601-FSS-PC-1031	41.6	7.2
5601-FSS-PC-1032	26.5	9.5

Notes:

Exceeds Site Specific Guidelines of 400 mg/Kg and 24 mg/Kg

Exceeds NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objective

Results obtained from *"Draft Final Status Survey Report"* September 2008"

2003 EPA ENDPOINT SAMPLING RESULTS

Parcel Lower C Exempt Area Remediation Metals Sample Results						
Exempted Gas Line Area						
	Date	Sample ID	Sample Type	Location	Lead (ppm)	Arsenic (ppm)
EA-4	10/27/2003	LPC-GA-EW3	Wall	1	45.5	**48**
	10/27/2003	LPC-GA-EW4	Wall	2	17.7	14.3
	10/27/2003	LPC-GA-WW3	Wall	3	17.9	**62.6**
	10/27/2003	LPC-GA-WW4	Wall	4	9.24***	**16.85*** **
	10/27/2003	LPC-GA-NW1	Wall	5	22.6	**421.4**
	10/27/2003	LPC-GA-F1	Floor	6	36.8	**266.6**
	10/27/2003	LPC-GA-F2	Floor	7	263.5	**965.5**
	10/27/2003	LPC-GA-F3	Floor	8	255.7	**166.3**
	10/27/2003	LPC-GA-F4	Floor	9	301.8	**408.4**
	10/28/2003	LPC-GA-EW5	Wall	10	55.7	**1036**
	10/28/2003	LPC-GA-EW6	Wall	11	64.3	**237.2**
	10/28/2003	LPC-GA-EW7	Wall	12	25.8	5.82***
	10/28/2003	LPC-GA-EW8	Wall	13	16.3***	13.1***
	10/28/2003	LPC-GA-EW9	Wall	14	20.1	11.77***
	10/28/2003	LPC-GA-EW10	Wall	15	15.8	6.33***
General Dynamics Exempted Area						
	Date	Sample ID	Sample Type	Location	Lead (mg/Kg)	Arsenic (mg/Kg)
EA-3	10/29/2003	LPC-GD-WW1	Wall	16	54.1	9.82***
	10/29/2003	LPC-GD-WW2	Wall	17	**1982**	**782.7**
	10/29/2003	LPC-GD-WW3	Wall	18	**9559.7**	**193971.2**
	10/29/2003	LPC-GD-WW4	Wall	19	24.5	13.8
	10/29/2003	LPC-GD-WW5	Wall	20	**1427.2**	**745.7**
	10/30/2003	LPC-GD-WW6	Wall	21	13.8***	13.3
	10/30/2003	LPC-GD-WW7	Wall	22	59.4	13.4
	10/30/2003	LPC-GD-WW8	Wall	23	**466.7**	**172.8**
	10/30/2003	LPC-GD-WW9	Wall	24	13	***17.1***
	10/30/2003	General Dynamics-1	Floor*	25	133.8	**33.4**
	10/30/2003	General Dynamics-2	Floor*	26	**1433.1**	**242**
	10/30/2003	General Dynamics-3	Floor*	27	**5895.4**	**1139.2**

Notes:

Exceeds SWCLS

Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective

*Sample collected from the surface investigation conducted beyond the Li Tungsten Fence

***Value was below Limit of Detection (LOD) of instrument

Results obtained from *"Remedial Action Report For Operable Unit One (Li Tungsten Facility)"* September 2008

2001 EPA ENDPOINT SAMPLING RESULTS

Parcel Lower C Excavation Areas Confirmatory Composite Sampling Results				
Excavation Areas	Arsenic (mg/Kg)	Lead (mg/Kg)	Radium 226 (pCi/g)	Thorium 232 (p/Ci/g)
13	840	320	NS	NS
13a	170	350	1	1
14	110	220	NS	NS
14a	39	790	1	2.5
15	82	400	1	1
15a	**20**	40	NS	NS
15b	58	150	NS	NS
15c	12	32	NS	NS
16	747	686	NS	NS
17	1120	807	NS	NS

Notes:

Exceeds SWCLS

Lead: 400 mg/Kg

Arsenic: 24 mg/Kg

Radium 226 5pCi/g > backgroud

Thorium 232 5pCi/g > background

Background radiation levels are 1 pCi/g

Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective

Lead: 400 mg/Kg

Arsenic: 16 mg/Kg

Results obtained from *"Remedial Action Report For Operable Unit One (Li Tungsten Facility)"* September 2008

2003 GLEN ISLE VERIFICATION SAMPLING RESULTS

Parcel Lower C Metals and Semivolatile Organic Compounds Sampling Results										
Sample ID	PLC1	PLC2	PLC3A	PLC3B	PLC3C	PLC5	PLC6	TAGM Values	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	.5-1	.5-1	.5-13	.5-1	.5-1	.5-1	4-5			
Semivolatile Organics (ug/Kg)										
Benzo (a) anthracene	390	718	NS	U	U	207	U	224	1000	1000
Chrysene	538	877	NS	U	U	246	U	400	1000	3900
Benzo (a) pyrene	430	855	NS	U	U	264	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	NS	U	U	U	U	14	330	330
Total SVOC's	1358	2450	NS	U	U	264	U	500,000		
Metals (mg/Kg)										
Arsenic	**246**	**20.3**	NS	2.76	6.91	**155**	**260**	7.5	13	16
Cadmium	*7.48*	0.8	NS	0.56	1.88	2.66	**15.6**	10	2.5	4.3
Chromium	52.9	12.2	NS	4.3	20.7	11.2	20.5	50	30	180
Lead	373	53	NS	2.8	8.15	263	**533**	400	63	400
Mercury	**1.6**	0.045	NS	0.013	0.025	**1.55**	0.76	0.1	0.18	0.81
Depth (ft)	5-5.5	4-5	6-6.5	1-12	3-4	4-5	6-7			
Semivolatile Organics (ug/Kg)										
Benzo (a) anthracene	U	U	U	NS	U	U	U	224	1000	1000
Chrysene	U	U	U	NS	U	U	U	400	1000	3900
Benzo (a) pyrene	U	U	U	NS	U	U	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	NS	U	U	U	14	330	330
Total SVOC's	U	U	6,914	NS	U	U	U	500,000		
Metals (mg/Kg)										
Arsenic	**47.9**	**501**	**7.63**	NS	**10.1**	**203**	195	7.5	13	16
Cadmium	1.1	1.29	0.88	NS	2.42	1.71	1.09	10	2.5	4.3
Chromium	2.29	12	6.38	NS	14.7	17.9	14	50	30	180
Lead	7.34	7.63	43.4	NS	57.3	28.1	33.2	400	63	400
Mercury	0.093	U	0.018	NS	0.018	**1.95**	0.055	0.1	0.18	0.81
Depth (ft)	6-6.5	10-12	8-9	12-13	6-7	7-8	11-12			
Semivolatile Organics (ug/Kg)										
Benzo (a) anthracene	U	U	U	U	U	436	U	224	1000	1000
Chrysene	U	U	U	U	U	489	U	400	1000	3900
Benzo (a) pyrene	U	U	U	U	U	500	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	U	U	U	U	14	330	330
Total SVOC's	U	U	54	202	U	1425	U	500,000		
Metals (mg/Kg)										
Arsenic	**384**	**11.7**	6.84	U	1.94	**68.1**	2.24	7.5	13	16
Cadmium	3	0.51	1.23	1.15	0.85	0.84	0.41	10	2.5	4.3
Chromium	10.9	6.15	24.5	15.2	15.1	7.26	11.9	50	30	180
Lead	9.64	11.9	9.35	5.44	9.41	29.7	5.12	400	63	400
Mercury	U	U	0.0092	0.0089	0.011	0.26	0.015	0.1	0.18	0.81

Notes:

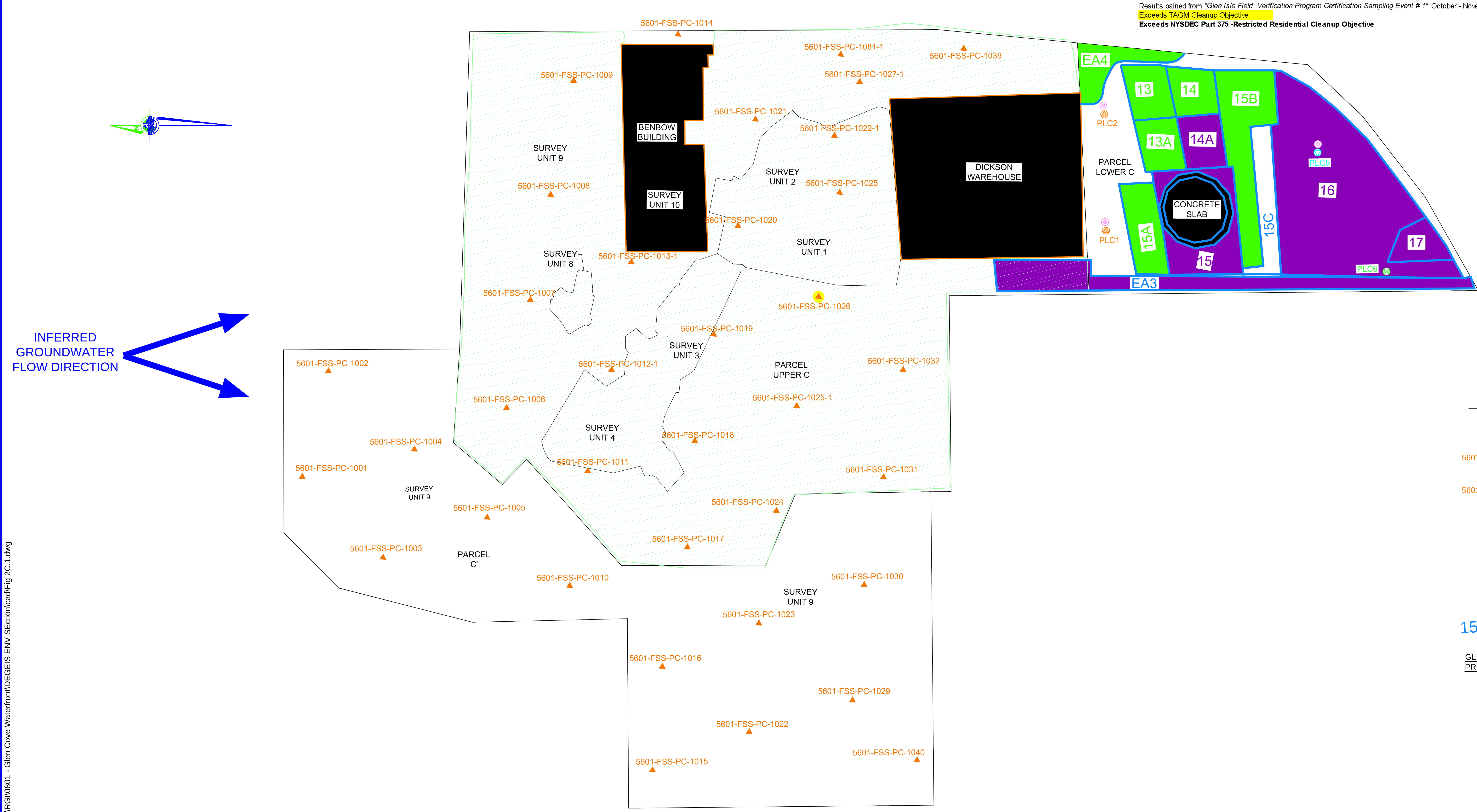
U = Below Detection Limit

NS = Not Sampled

Results oained from *"Glen Isle Field Verification Program Certification Sampling Event # 1"* October - November 2003

Exceeds TAGM Cleanup Objective

Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective



LI TUNGSTEN PARCEL C, C' & LOWER C

SCALE: ~1" = 60'

DRAFT FINAL STATUS SURVEY RESULTS

- SITE BOUNDARY
- METALS AREA, EXCAVATION CUT LINES
- 5601-FSS-PC-1015 METALS ENDPOINT SAMPLE APPROXIMATE LOCATION
- 5601-FSS-PC-1026 METALS ENDPOINT SAMPLE EXCEEDING SWCL - ARSENIC

USEPA REMEDIAL ACTIONS FOR OUI RESULTS

- EXCEEDANCE OF CLEAN UP OBJECTIVE - ARSENIC & LEAD
- EXCEEDANCE OF CLEAN UP OBJECTIVE - ARSENIC
- 15 APPROXIMATE EXCAVATION AREAS

GLEN ISLE FIELD VERIFICATION PROGRAM RESULTS:

- SURFACE SVOC
- SUB-SURFACE SVOC
- SUB-SURFACE METALS
- SURFACE & SUB-SURFACE METALS

0 60 120

SCALE: ~1" = 60'

INFORMATION PROVIDED BY:
ECC 1746 COLE BLVD.
BUILDING 21, SUITE 350
LAKEWOOD, CO 80401

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DEGEIS ENV Section\cad\Fig 2C.1.dwg

PWGC

Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/21/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

LI TUNGSTEN PARCEL
"C, C' & LOWER C"
METALS AREA FINAL
SAMPLE LOCATIONS

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 2C.1

2006 & 2007 EPA ENDPOINT SAMPLING RESULTS

Radiological Survey Results				
Sample ID	Ra-226 (pCi/g)	Ra-228 (pCi/g)	Th-230 (pCi/g)	Th-232 (pCi/g)
5601-FSS-SU1-1001	0.47	0.89	0.58	0.64
5601-FSS-SU1-1002	0.69	0.20	0.75	0.85
5601-FSS-SU1-1003	0.55	0.87	0.50	0.56
5601-FSS-SU1-1004	0.65	0.69	0.60	0.62
5601-FSS-SU1-1005	0.49	0.47	0.62	0.82
5601-FSS-SU1-1006	0.70	0.87	0.65	0.78
5601-FSS-SU1-1007	0.35	0.49	0.48	0.62
5601-FSS-SU1-1008	0.69	0.68	0.69	0.87
5601-FSS-SU1-1009	0.41	0.28	0.45	0.51
5601-FSS-SU1-1010	0.60	0.73	0.58	0.75
5601-FSS-SU1-1011	0.85	0.90	0.90	0.87
5601-FSS-SU2-1001	0.97	1.18	0.82	0.80
5601-FSS-SU2-1002	1.36	0.08	0.80	0.92
5601-FSS-SU2-1003	1.48	1.55	0.57	0.83
5601-FSS-SU2-1004	1.62	1.38	0.78	0.95
5601-FSS-SU2-1005	1.02	0.88	0.64	0.93
5601-FSS-SU2-1006	1.00	0.94	0.57	0.78
5601-FSS-SU2-1007	0.75	1.03	0.52	0.70
5601-FSS-SU2-1008	1.16	1.26	0.78	1.10
5601-FSS-SU2-1009	1.10	1.18	0.74	0.95
5601-FSS-SU2-1010	0.53	0.53	0.50	0.63
5601-FSS-SU2-1011	1.44	1.20	0.89	1.10
5601-FSS-SU3-1001	0.56	0.78	0.49	0.48
5601-FSS-SU3-1002	0.74	0.82	0.34	0.59
5601-FSS-SU3-1003	0.49	0.53	0.47	0.63
5601-FSS-SU3-1004	0.54	0.70	0.38	0.46
5601-FSS-SU3-1005	0.87	0.83	0.51	0.72
5601-FSS-SU3-1006	0.78	0.76	0.47	0.82
5601-FSS-SU3-1007	0.67	0.57	0.52	0.51
5601-FSS-SU3-1008	0.82	0.72	0.66	0.69
5601-FSS-SU3-1009	1.01	0.68	0.53	0.74
5601-FSS-SU3-1010	0.73	0.86	0.52	0.61
5601-FSS-SU3-1011	1.12	0.95	0.86	0.84
5601-FSS-SU4-1001	1.04	0.89	0.66	0.77
5601-FSS-SU4-1002	0.40	0.05	0.25	0.28
5601-FSS-SU4-1003	0.22	0.19	0.13	0.13
5601-FSS-SU4-1004	1.33	0.97	1.01	1.10
5601-FSS-SU4-1005	0.93	0.71	0.64	0.86
5601-FSS-SU4-1006	1.40	0.83	0.93	0.89
5601-FSS-SU4-1007	0.33	-0.03	0.43	0.43
5601-FSS-SU4-1008	1.36	1.01	1.56	1.71
5601-FSS-SU4-1009	0.43	0.39	0.36	0.54
5601-FSS-SU4-1010	1.36	1.15	0.97	1.08
5601-FSS-SU4-1011	0.22	0.62	0.48	0.58
5601-FSS-SU4-1018	1.05	0.62	0.61	0.58
5601-FSS-SU4-1019	0.90	0.84	0.82	0.93
5601-FSS-SU8-1001	0.83	1.11	0.59	0.80
5601-FSS-SU8-1002	1.64	1.59	0.97	1.25
5601-FSS-SU8-1003	1.31	0.96	0.65	0.66
5601-FSS-SU8-1004	1.10	0.80	0.69	0.84
5601-FSS-SU8-1005	1.32	0.63	1.09	1.14
5601-FSS-SU8-1006	0.99	1.43	0.79	1.06
5601-FSS-SU8-1007	0.93	0.42	0.48	0.63
5601-FSS-SU8-1008	1.55	1.17	1.50	1.54
5601-FSS-SU8-1009	1.24	1.30	0.96	1.39
5601-FSS-SU8-1010	1.12	0.47	0.81	0.90
5601-FSS-SU8-1011	1.12	0.35	0.53	0.85
5601-FSS-SU9-1001	0.87	0.77	0.53	0.59
5601-FSS-SU9-1002	0.80	1.10	0.52	0.59
5601-FSS-SU9-1003	0.78	0.29	0.47	0.68
5601-FSS-SU9-1004	0.64	0.59	0.48	0.55
5601-FSS-SU9-1005	0.38	0.81	0.39	0.47
5601-FSS-SU9-1006	1.14	0.97	0.77	0.87
5601-FSS-SU9-1007	0.82	1.25	0.71	0.88
5601-FSS-SU9-1008	0.59	0.91	0.56	0.68
5601-FSS-SU9-1009	0.42	0.48	0.41	0.45
5601-FSS-SU9-1010	0.94	0.74	0.77	0.76
5601-FSS-SU9-1011	1.17	1.01	0.61	0.92
5601-FSS-SU10-1001	0.82	1.07	0.73	1.01
5601-FSS-SU10-1002	0.76	0.67	0.72	0.84
5601-FSS-SU10-1003	1.06	0.53	1.19	1.16
5601-FSS-SU10-1004	1.19	0.94	0.94	1.58
5601-FSS-SU10-1005	0.98	0.71	0.68	0.71
5601-FSS-SU10-1006	1.01	0.49	0.74	0.87
5601-FSS-SU10-1007	1.11	0.71	0.72	0.77
5601-FSS-SU10-1008	1.50	2.71	2.72	2.68
5601-FSS-SU10-1009	1.02	0.79	0.78	1.19
5601-FSS-SU10-1010	2.16	4.66	2.48	**6.60**
5601-FSS-SU10-1011	1.16	0.61	0.63	0.82
5601-FSS-SU10-1010-N	3.63	**16.80**	**5.30**	**17.90**
5601-FSS-SU10-1010-S	1.04	1.73	0.93	1.57
5601-FSS-SU10-1010-E	0.85	0.89	0.87	1.17
5601-FSS-SU10-1010-W	0.98	0.62	0.82	1.05

Notes:

Exceeds SWCLS

Results obtained from *"Draft Final Status Survey Report"* September 2008

DRAFT FINAL STATUS SURVEY RESULTS

SITE BOUNDARY

METALS AREA, EXCAVATION CUT LINES

EXCEEDS SITE WIDE CLEANUP OBJECTIVES - RADIOLOGICAL

9-1007 ENDPOINT SAMPLE APPROIXMATE LOCATION

LI TUNGSTEN PARCEL C & C'

SCALE: ~1" = 60'

0 60 120
SCALE: ~1" = 60'

INFORMATION PROVIDED BY:
ECC 1746 COLE BLVD.
BUILDING 21, SUITE 350
LAKEWOOD, CO 80401

J:\Projects M-R\RGI\0801 - Glen Cove Waterfront\DEGEIS ENV SEction\cad\Fig 2C.2.dwg

PWGC
Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/21/09
DRAWN BY: LLG	SCALE: AS SHOWN

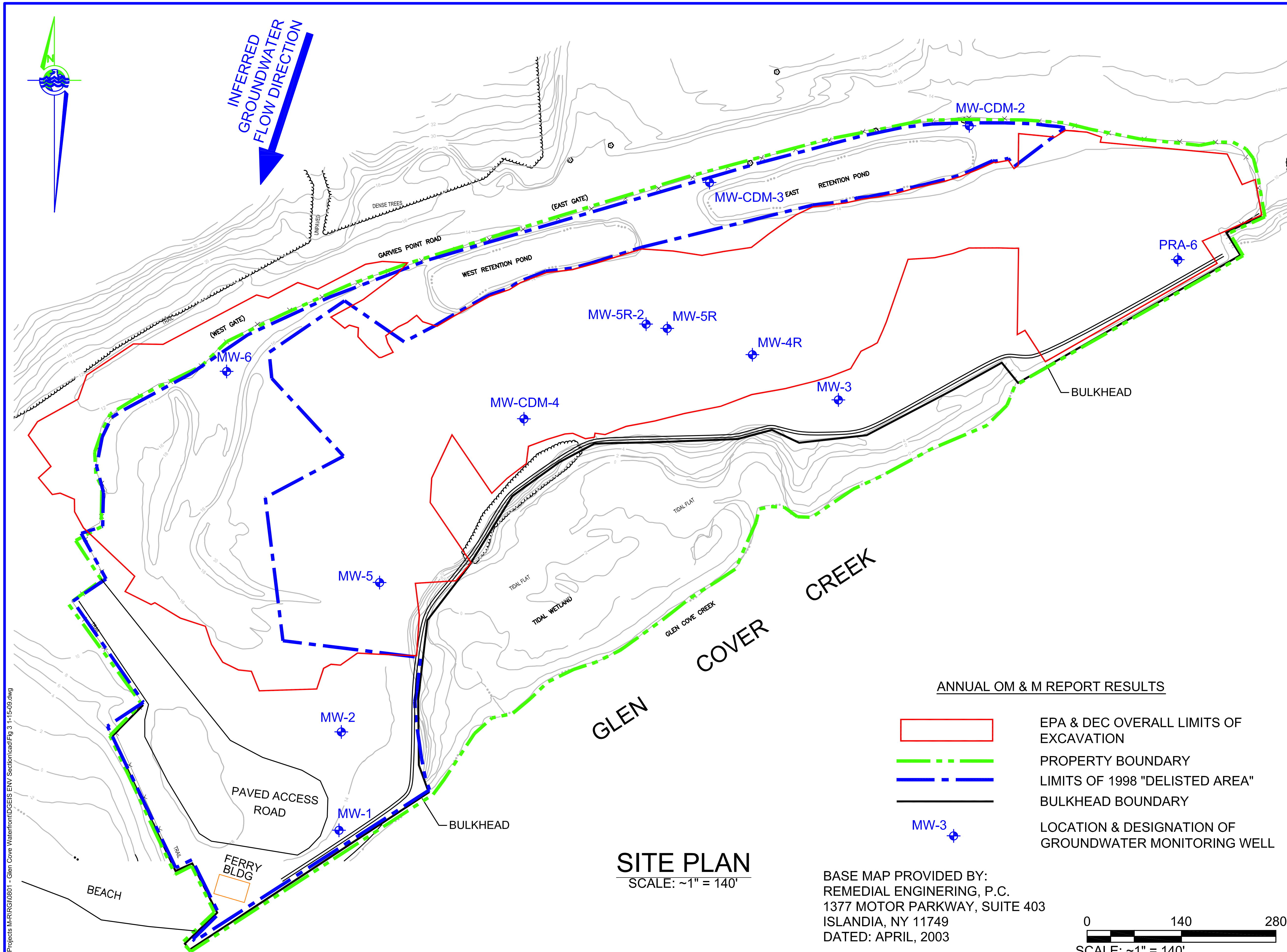
SHEET TITLE

LI TUNGSTEN PARCEL
"C & C'"
RADIOLOGICAL SURVEY UNIT
FINAL SAMPLE LOCATIONS

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO
2C.2

SHEET 8 OF 14



PWGC
Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE
PARTNERS, LLC

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT:	RGI0801	APPROVED BY:	LS
DESIGNED BY:	ZY	DATE:	12/12/08
DRAWN BY:	LLG	SCALE:	AS SHOWN

SHEET TITLE

CAPTAIN'S COVE

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 3

SHEET 9 OF 14

2003 GLEN ISLE VERIFICATION SAMPLING RESULTS

Delisted Area Metals and Semivolatile Organics Sampling Results							
Sample ID	D1	D2	D3	D4	TAGM Values	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	0.5-1	0.5-1	0.5-1	0.5-1			
Volatile Organics (ug/Kg)							
Toluene	NS	NS	NS	NS	1,500	700	100000
Xylene	NS	NS	NS	NS	1,200	260	100000
Semivolatile Organics (ug/Kg)							
Benzo (a) anthracene	U	**4170**	507	**4590**	224	1000	1000
Chrysene	U	**4520**	628	**4810**	400	1000	3900
bis (2-Ethylhexyl) phthalate	U	U	U	U	50,000	NS	NS
Benzo (b) fluoranthene	U	**3180**	U	**3940**	1100	1000	1000
Benzo (k) fluoranthene	U	**3320**	U	**4520**	1100	800	3900
Benzo (a) pyrene	U	**4350**	U	**4640**	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	**757**	14	330	330
Metals (mg/Kg)							
Arsenic	2.63	6.72	4.74	8.4	7.5	13	16
Mercury	0.017	0.04	0.095	0.094	0.1	0.18	0.81
Depth (ft)	3-3.5	2-3	5-6	3-4			
Volatile Organics (ug/Kg)							
Toluene	NS	**60,000,000**	NS	NS	1,500	700	100000
Xylene	NS	**3,600,000**	NS	NS	1,200	260	100000
Semivolatile Organics (ug/Kg)							
Benzo (a) anthracene	U	U	U	84	224	1000	1000
Chrysene	U	U	U	U	400	1000	3900
bis (2-Ethylhexyl) phthalate	U	479,000	U	54	50,000	NS	NS
Benzo (b) fluoranthene	U	U	U	U	1100	1000	1000
Benzo (k) fluoranthene	U	U	U	U	1100	800	3900
Benzo (a) pyrene	U	U	U	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	U	14	330	330
Metals(mg/Kg)							
Arsenic	14.9	U	1.82	4.1	7.5	13	16
Mercury	0.74	0.099	0.046	0.11	0.1	0.18	0.81
Depth (ft)	9-9.5	6-7	10-11	5-6			
Volatile Organics (ug/Kg)							
Toluene	NS	8.59	NS	NS	1,500	700	100000
Xylene	NS	U	NS	NS	1,200	260	100000
Semivolatile Organics (ug/Kg)							
Benzo (a) anthracene	U	U	U	U	224	1000	1000
Chrysene	U	U	U	U	400	1000	3900
bis (2-Ethylhexyl) phthalate	U	47	U	U	50,000	NS	NS
Benzo (b) fluoranthene	U	U	U	U	1100	1000	1000
Benzo (k) fluoranthene	U	U	U	U	1100	800	3900
Benzo (a) pyrene	U	U	U	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	U	14	330	330
Metals (mg/Kg)							
Arsenic	0.6	3.2	2.57	1.42	7.5	13	16
Mercury	U	0.28	0.11	0.0069	0.1	0.18	0.81

Notes:
Exceeds TAGM Cleanup Objective
Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective
U: Undetected
Results oained from *"Glen Isle Field Verification Program Certification Sampling Event #1"* October-November 2003

2003 GLEN ISLE VERIFICATION SAMPLING RESULTS

Retention Basin Metals and Semivolatile Organics Sampling Results									
Sample ID	WB1	WB2	WB3	EB1	EB2	EB3	TAGM Values	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	2-2.5	2-2.5	0.5-1.5	0-1	0-1	0-1			
Semivolatile Organics (ug/Kg)									
Benzo (a) anthracene	49	113	488	U	U	U	224	1000	1000
Chrysene	59	129	557	U	U	U	400	1000	3900
Benzo (a) pyrene	53	124	408	U	U	U	61	1000	1000
Dibenzo (a,h) anthracene	U	U	61	U	U	U	14	330	330
Metals (mg/Kg)									
Arsenic	13.7	**33.5**	6.74	**31.7**	4.18	0.56	7.5	13	16
Chromium	2.1	71.6	2.87	0.33	0.31	0.16	50	30	180
Mercury	0.29	**1.03**	0.49	U	U	U	0.1	0.18	0.81
Depth (ft)	2.5-3	3-4	2-3	4-5	3.5-4.5				
Semivolatile Organics (ug/Kg)									
Benzo (a) anthracene	U	U	U	U	U	NS	224	1000	1000
Chrysene	U	U	U	U	U	NS	400	1000	3900
Benzo (a) pyrene	U	U	U	U	U	NS	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	U	U	NS	14	330	330
Metals (mg/Kg)									
Arsenic	1.03	7.47	0.54	1.23	1.02	NS	7.5	13	16
Chromium	0.85	1.84	0.037	1.05	0.6	NS	50	30	180
Mercury	0.022	0.011	3.96	U	U	NS	0.1	0.18	0.81
Depth (ft)	7-8	7-8	4-5	9-10	9-10	9-10			
Semivolatile Organics (ug/Kg)									
Benzo (a) anthracene	U	U	U	U	U	232	224	1000	1000
Chrysene	U	U	U	U	U	388	400	1000	3900
Benzo (a) pyrene	U	U	U	U	U	182	61	1000	1000
Dibenzo (a,h) anthracene	U	U	U	U	U	U	14	330	330
Metals (mg/Kg)									
Arsenic	2.69	U	U	5.42	U	8.25	7.5	13	16
Chromium	0.3	0.92	1.33	1.45	1.01	1.71	50	30	180
Mercury	0.029	0.016	0.011	0.029	0.006	0.11	0.1	0.18	0.81

Notes:
Exceeds TAGM Cleanup Objective
Exceeds NYSDEC Part 375 -Restricted Residential Cleanup Objective
U: Undetected
Results obtained from *"Glen Isle Field Verification Program Certification Sampling Event #1"* October-November 2003

1997 NYSDEC & USEPA REMEDIAL INVESTIGATION RESULTS

Metals Exceeding an SCG in Surface Soil										
Sample ID Date Sampled	SS-1 8/27/1997	SS-2 8/27/1997	SS-3 8/27/1997	SS-4 8/27/1997	SS-14 9/1/1997	SS-16 9/1/1997	SS-17 9/1/1997	TAGM Value	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Metals (mg/Kg)										
Arsenic	5.17	11.6	9.8	7.31	6.07	2.04	7.34	7.5 or SB	13	16
Chromium	19.7	20.4	17.2	19.3	13.9	15.3	17.2	10 or SB	30	180
Copper	32.3	89.5	58.9	98.4	67.6	38.6	75.2	25 or SB	50	270
Nickel	9.56	21.9	10.2	13.9	10.9	3.61	9.6	13 or SB	30	310
Mercury	U	U	0.235	U	U	U	U	0.1	0.18	0.81
Selenium	U	U	U	8.56	U	U	U	2 or SB	3.9	180
Zinc	82.6	172	149	154	184	89.1	129	20 or SB	109	10000

Notes:
Exceeds TAGM values
Exceeds NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
U: Indicates analyte analyzed for but not detected
Results obtained from *"Final Remedial Investigation Report Volume 1 of 2"* January 1999

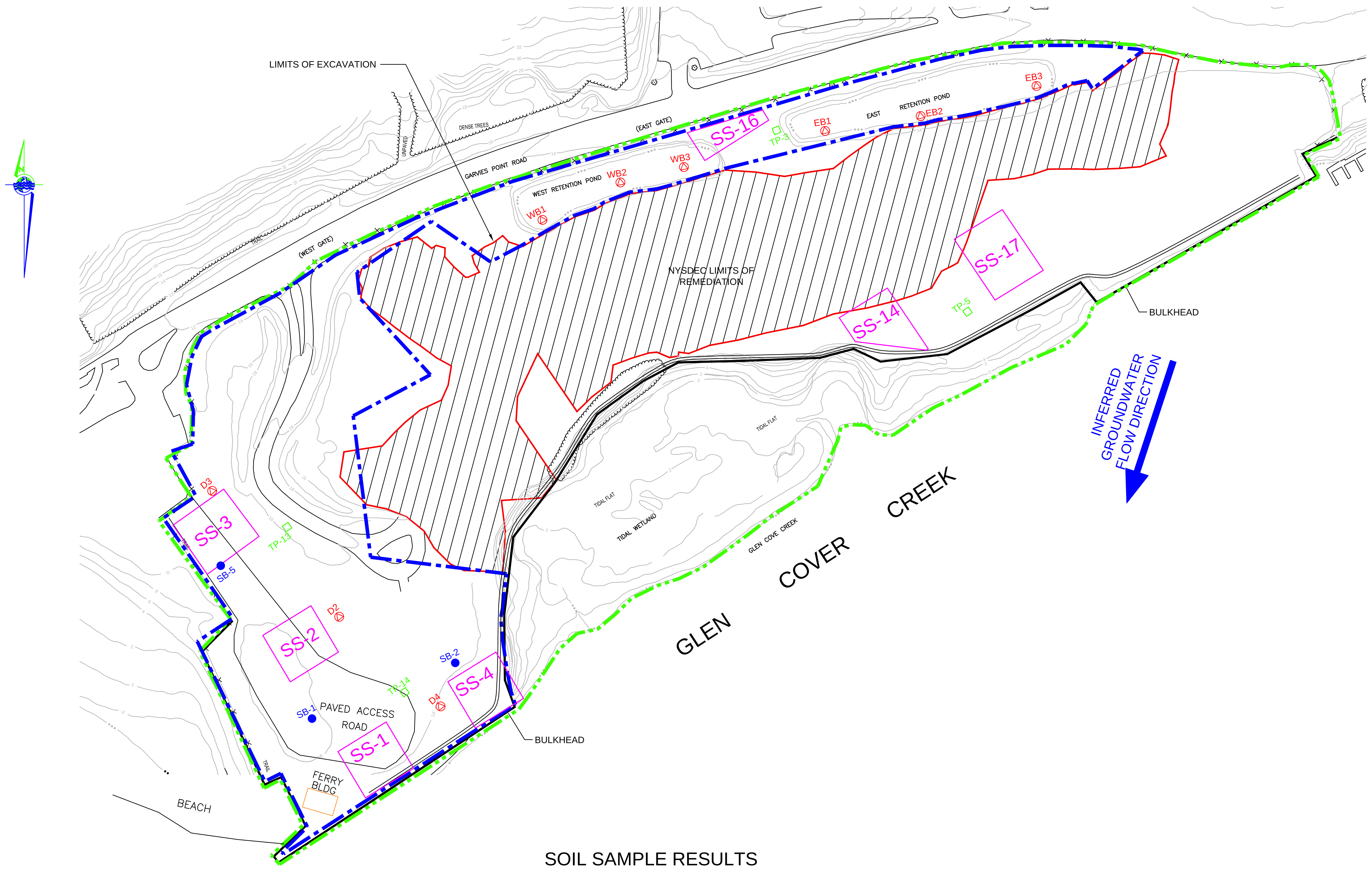
Distribution of Waste Material in Test Pits and Soil Borings									
Sample ID	SB-1	SB-2	SB-3	SB-5	TP-3	TP-5	TP-13	TP-14	TP-14
Depth		1-3'	1-1.5'	0-4.5'	0-6'	0-2'	0-3'	2-4'	2-4'
Waste Material	No Waste	<5% C&D Debris	<5% C&D Debris	<5% C&D Debris	<5% C&D Debris	<5% C&D Debris	<5% C&D Debris	<5% C&D Debris	Yard Waste

Results obtained from Notes *"Final Remedial Investigation Report Volume 1 of 2"* January 1999

PWGC
Strategic Environmental & Engineering Solutions

630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS



FINAL REMEDIAL INVESTIGATION REPORT V 1 OF 2

LIMITS OF NYSDEC REMEDIATION
PROPERTY BOUNDARY
LIMITS OF 1998 "DELISTED AREA"
BULKHEAD BOUNDARY
SB-1 SOIL BORING
TP-1 TEST PIT
SS-3 SURFACE SOIL SAMPLE

GLEN ISLE FIELD VERIFICATION PROGRAM EVENT #1

D1 SAMPLE LOCATIONS

0 100 200
SCALE: ~1" = 100'

BASE MAP PROVIDED BY:
REMEDIAL ENGINEERING, P.C.
1377 MOTOR PARKWAY, SUITE 403
ISLANDIA, NY 11749
DATED: APRIL, 2003

SOIL SAMPLE RESULTS
SCALE: ~1" = 100'

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 3B 2-4-09.dwg

DRAWINGS PREPARED FOR
RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/15/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

CAPTAIN'S COVE
SOIL SAMPLE RESULTS

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 3A

SHEET 10 OF 14

2001 & 2002 EPA ENDPOINT SAMPLING RESULTS

Post Excavation Metal Data

Location	Excavation Depth (ft)	Arsenic (mg/Kg)	Lead (mg/Kg)
A' 1	8-14	84.4	230
A' 2	8-12	ND	770
A1	6-12	120	69
A2	12	138	121
A3	12	127	96
A4	6-12	136	984
B1	6-12	125	ND
B2	12	120	ND
B3	12	173	108
B4	12	120	193
C3	8-12	130	ND
E1	7	222	539
E2	9	166	ND
E3	9	130	ND
G5	4-5	122	ND
H4	6-9	144	ND
I2	3-8	460	ND
I5	3-8	140	777
I6	3-8	220	ND
J2	4-6	290	896
J3	5-6	156	ND
K3	5-6	ND	869
K4	5-6	130	ND
M3	2-6	166	ND
Q8	10-12	62	78
Q9	10-12	49	53
Q12	10-12	43	ND
R8	10-12	138	ND
R11	10-12	94	ND
R12	10-12	33	ND
R13	10-12	54	111
S8	12-14	180	53
S9	12-14	81	ND
S10	12-14	173	ND
S11	12-14	43	ND
S12	12-14	74	ND
S13	12-14	83	241
T8	12-14	35	79
T9	12-14	235	53
T10	12-14	53	136
T12	3	96	ND
U8	3-6	84	112

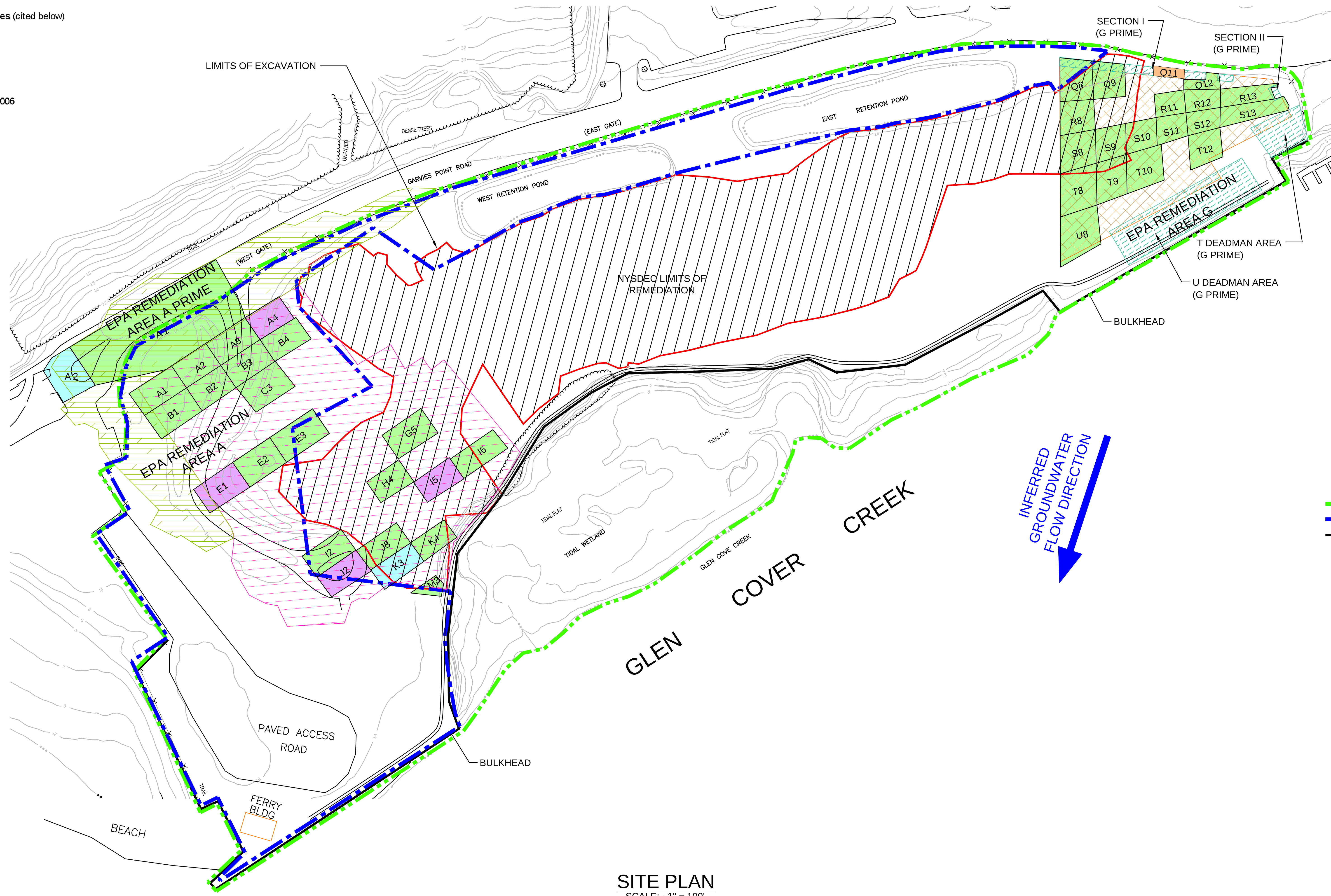
Notes:
Values exceed site specific respose criteria (cited below)
Exceeds NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives (cited below)
Site specific response criteria:
Arsenic = 24 (mg/Kg)
Lead = 400 (mg/Kg)
Part 375 soil cleanup objectives:
Lead = 400 (mg/Kg)
Arsenic = 16 (mg/Kg)
Results obtained from *"Remedial Action Report for Operable Unit 2"* September 2006

2001 & 2002 EPA ENDPOINT SAMPLING RESULTS

Post Excavation Radiological Data

Location	Excavation Depth (ft)	Radium (pCi/g)	Thorium (pCi/g)
A' 7	3-5	11	4.4
Q11	4	23.3	ND

Notes:
Values exceed site specific respose criteria (cited below)
Background = 1 pCi/g for Radium226 and Thorium232
Radium = 5 pCi/g above background
Thorium = 5 pCi/g above background
Results obtained from *"Remedial Action Report for Operable Unit 2"* September 2006



LEGEND

LIMITS OF NYSDEC EXCAVATION BOUNDARY
PROPERTY BOUNDARY
LIMITS OF 1998 "DELISTED AREA"
BULKHEAD BOUNDARY
EPA REMEDIATION AREA A
EPA REMEDIATION AREA A PRIME
EPA REMEDIATION AREA G
EPA REMEDIATION AREA G PRIME (SECTION I, II & U&T DEADMAN AREA)

USEPA POST EXCAVATION DATA

EXCEEDANCE OF ARSENIC
EXCEEDANCE OF LEAD
EXCEEDANCE OF BOTH ARSENIC & LEAD
EXCEEDANCE OF RADIATION CONTAMINATION

SITE PLAN
SCALE: ~1" = 100'

0 100 200
SCALE: ~1" = 100'

BASE MAP PROVIDED BY:
REMEDIAL ENGINEERING, P.C.
1377 MOTOR PARKWAY, SUITE 403
ISLANDIA, NY 11749
DATED: APRIL, 2003

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 3A 2-4-09.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: PWG
DESIGNED BY: BB	DATE: 1/15/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

CAPTAIN'S COVE
EPA LIMITS OF EXCAVATION AND POST EXCAVATION DATA

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 3B

SHEET 11 OF 14

2000 & 2002 PHASE II ESA RESULTS

Gladsky Soil Sample Results-Supplmental Phase II

Sample ID	G-SS-2	G-SS-2B	G-SS-2C	G-SS-3	G-SS-3B	G-SS-3C	G-SS-4	G-SS-4B	G-SS-4C	G-SS-6A	G-SS-6B	G-SS-6C	G-SS-7A
Depth (in)	0-6	6-12	12-18	0-6	6-12	12-18	0-6	6-12	12-18	0-6	6-12	12-18	0-6
Date Collected	4/13/2000	3/13/2002	3/13/2002	4/13/2000	3/12/2002	4/13/2002	4/13/2000	4/13/2000	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002
Semivolatile Organics (ug/Kg)													
Napthalene	7,600 D	U	U	U	77 J	130 J	180 J	89 J	570 J	99 J	U	U	260 J
2-Methylnapthalene	18,000 D	U	U	U	140 J	77 J	100 J	62 J	U	200 J	U	U	470
Acenaphthylene	U	U	U	U	110 J	1,000	52 J	910	7,300	48 J	U	U	54 J
Acenaphthene	U	U	U	U	U	U	430	U	U	U	U	U	180 J
Dibenzofuran	U	U	U	U	U	120 J	190 J	55 J	410 J	U	U	U	130 J
Fluorene	U	U	U	U	U	280 J	350 J	100 J	1,200 J	U	U	U	210 J
Phenanthrene	U	47 J	490 J	U	220 J	2,500	11,000 D	1,200	12,000	290 J	U	U	2,000
Anthracene	U	U	U	U	64 J	700	2,100	410	3,800	69 J	U	U	360 J
Floranthene	U	77 J	U	28,000	400	3,600	20,000 D	2,300	24,000	370 J	72 J	U	2,500
Pyrene	U	81 J	U	2,500 D	700	5,000	25,000 D	3,600	33,000	350 J	52 J	U	2,400
Benzo (a) anthracene	U	40 J	U	**2,200**	250 J	**2,200**	**12,000 D**	**1,700**	**15,000**	190 J	41 J	U	**1,200**
Chrysene	U	78 J	620 J	2,200	320 J	2,400	**11,000 D**	1,600	**14,000**	290 J	47 J	U	1,400
Benzo (b) fluoranthene	U	100 J	U	**2,200**	550	**3,500**	**18,000 D**	**2,800**	**25,000**	350 J	48 J	U	**1,800**
Benzo (k) fluoanthene	U	39 J	U	590 J	210 J	1,400	**4,300 D**	1,100	**8,700**	110 J	U	U	540
Benzo (a) pyrene	U	41 J	U	U	260 J	**1,800**	**8,200 D**	**1,600**	**14,000**	170 J	U	U	**1,000**
Ideno (1,2,3-cd) pyrene	U	U	U	920 J	140 J	720	**3,400 JD**	650	**5,000**	97 J	U	U	390
Dibenzo (a,h) anthracene	U	U	U	U	36 J	200 J	**1,900**	180 J	**1,500 J**	U	U	U	110 J
Benzo (g,h,i) perylene	U	U	U	1,100 J	180 J	640	2,800 JD	560	4,200	84 J	U	U	330 J
Total carcinogenic PAH's	U	298	620	8,110	1,766	12,320	58,800	9,360	83,200	1,207	136	U	6,440
Total PAH's	25,600	503	1,110	14,510	3,657	26,367	121,002	18,916	169,680	2,717	260	U	15,334
Metals (mg/Kg)													
Arsenic	**3,380**	**44.4**	**30.9**	**94.5**	**33.3**	**40.2**	**26.2**	11	**22.4**	**29.1**	6.9	6.8	14.5
Cadmium	*4.6*	0.92	1.4	**13.2**	**12.8**	1	4.1	0.63	0.46	3.8	0.37	0.52	2.5
Chromium	**553**	13.5	24	168	53	14.7	101	12.1	14	47.4	11.1	16.6	17.9
Copper	**4,310**	**83.1**	61.3	**10,000**	**338**	52	**450**	210	74.1	**303**	22.2	27.6	**388**
Lead	**1,390**	85.7	87.3	**2730**	**739**	107	**740**	41.7	35.3	262	16.1	47.5	145
Nickel	**107**	10.4	19.9	**90.6**	20.7	9.6	**82.1**	11.1	10.9	21.7	8.6	10.6	16.3
Zinc	**2,350**	89.2	167	3,250	355	83.1	1,070	42.9	36.2	290	34	66.2	359

Sample ID	G-SS-7B	G-SS-7C	G-SS-8A	G-SS-8B	G-SS-8C	G-SS-9A	G-SS-9B	G-SS-9C	G-SS-10A	G-SS-10B	G-SS-10C	TAGM Value	USEPA Risk Based Concentration	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (in)	6-12	12-18	0-6	6-12	12-18	0-6	6-12	12-18	0-6	6-12	12-18				
Date Collected	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002	3/13/2002				
Semivolatile Organics (ug/Kg)															
Napthalene	U	U	U	U	U	U	U	U	U	U	U	13,000	41,000,000	12000	100000
2-Methylnapthalene	51 J	U	450 J	43 J	U	U	U	U	45 J	U	U	36,400	41,000,000	NS	NS
Acenaphthylene	U	U	U	U	160 J	58 J	U	U	260 J	81 J	75 J	41,000		100000	100000
Acenaphthene	U	U	U	U	U	U	U	U	U	U	U	50,000	120,000,000	20000	100000
Dibenzofuran	U	U	U	U	U	U	U	U	U	U	U	6,200	8,200,000	NS	NS
Fluorene	U	U	U	U	U	U	U	U	U	U	U	50,000	82,000,000	30000	100000
Phenanthrene	64 J	180 J	1,300 J	170 J	330 J	210 J	64 J	310 J	170 J	91 J	65 J	50,000		100000	100000
Anthracene	U	36 J	U	U	110 J	56 J	U	73 J	100 J	39 J	U	50,000	610,000,000	100000	100000
Floranthene	120 J	280 J	U	150 J	600	410 J	120 J	410	300 J	180 J	130 J	50,000	82,000,000	100000	100000
Pyrene	110 J	230 J	U	170 J	600	560	140 J	340 J	330 J	180 J	140 J	50,000	61,000,000	100000	100000
Benzo (a) anthracene	110 J	140 J	U	83 J	330 J	250 J	68 J	220 J	180 J	100 J	74 J	224 or MDL	7,800	1000	1000
Chrysene	130 J	160 J	1,400 J	210 J	360	290 J	82 J	240 J	220 J	120 J	88 J	400	780,000	1000	3900
Benzo (b) fluoranthene	210 J	180 J	450 J	170 J	450	450 J	120 J	260 J	370	180 J	160 J	1100	7,800	1000	1000
Benzo (k) fluoanthene	73 J	66 J	U	49 J	190 J	120 J	44 J	76 J	130 J	61 J	57 J	1100	78,000	800	3900
Benzo (a) pyrene	150 J	130 J	U	76 J	280 J	270 J	69 J	170 J	220 J	100 J	85 J	61 or MDL	780	1000	1000
Ideno (1,2,3-cd) pyrene	97 J	70 J	U	38 J	120 J	110 J	U	92 J	150 J	52 J	47 J	3200	7,800	500	500
Dibenzo (a,h) anthracene	U	U	U	U	U	U	U	U	34 J	U	U	14 or MDL	780	330	330
Benzo (g,h,i) perylene	96 J	65 J	U	35 J	95 J	100 J	U	80 J	180 J	53 J	49 J	50,000	NS	100000	100000
Total carcinogenic PAH's	770	746	1,850	626	1,730	1,490	383	1,058	1,304	613	511	10,000	NS	NS	NS
Total PAH's	1,211	1,537	3,600	1,194	3,625	2,884	707	2,271	2,689	1,237	970	NS	NS	NS	NS
Metals (mg/Kg)															
Arsenic	9.3	7	14.4	9.4	10.1	**102**	**23.9**	51	**33.5**	**17.9**	10.3	7.5 or SB	3.8	13	16
Cadmium	1.3	0.6	0.97	0.85	0.68	1.4	0.56	0.82	1.5	0.7	0.43	10 or SB	1000	2.5	4.3
Chromium	15.3	12	23.5	19	21.3	16.6	15.6	16.6	18.3	18.6	14.5	50 or SB	310000	30	180
Copper	130	65.7	116	47.3	63.1	95.2	25.5	51.5	97.5	55	30.3	25 or SB	82000	50	270
Lead	90.8	61.8	183	79.6	50	132	54.9	77.9	239	130	55.1	400*		63	400
Nickel	10.7	7.8	23.4	9.7	17.1	12	9.2	9	11.9	10.8	7.6	13 or SB	41000	30	310
Zinc	319	97.3	204	57.5	31.7	121	65.3	74.1	122	75.4	47.7	20 or SB	610000	109	10000

Results obtained from *"Phase II Environmental Site Assessment Report"* September 2002

Gladsky Soil Sample Results

Sample ID	G-SS-2	G-SS-3	G-SS-4	G-SS-5	G-P-1	G-P-4	G-P-5	TAGM Value	USEPA Risk Based Concentration	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	0-0.5	0-0.5	0-0.5	0-0.5	5-7	4-6	4-6				
Date Collected	4/13/2000	4/13/2000	4/13/2000	4/13/2000	4/12/2000	4/13/2000	4/13/2000				
Semivolatile Organics (ug/Kg)											
Phenol	100 J	U	U	U	U	U	U	30 or MDL	1200000000	330	100000
Benzo (a) anthracene	U	**2200**	**12000 D**	660	U	260 J	U	224 or MDL	7800	1000	1000
Chrysene	U	2200	**11000 D**	890	U	U	U	400	780000	1000	3900
Benzo (b) fluoranthene	U	**2200**	**18000 D**	980	U	U	U	1100	7800	1000	1000
Benzo (k) fluoanthene	U	590 J	**4300 D**	310 J	U	U	U	1100	78000	800	3900
Benzo (a) pyrene	U	U	**8200 D**	500	U	170 J	U	61 or MDL	780	1000	1000
Ideno (1,2,3-cd) pyrene	U	920 J	**3400 D**	500	U	U	U	3200	7800	500	500
Dibenzo (a,h) anthracene	U	U	**1900**	130 J	U	U	U	14 or MDL	780	330	330
Total carcinogenic SVOC's	U	8110	**58800**	3970	U	U	U	NS	NS	NS	NS
PCB's (ug/Kg)											
Aroclor-1254	U	430 P	**1100**	150 P	U	U	U	1000	2900	NS	NS
Total PCB's	U	430	**1100**	150	U	U	U	1000	2900	1000	1000
Metals (mg/Kg)											
Arsenic	**3380**	**94.5**	**26.2**	**15.1**	1.6 B	4.7	1.4	7.5 or SB	3.8	13	16
Barium	**1220**	208	83.5	63.5	19.6	25.2	16.2	300 or SB	140000	350	400
Beryllium	0.26 B	0.18 B	0.21 B	U	0.26 B	0.15 B	0.24 B	0.16 or SB	4100	7.2	72
Cadmium	**4.6**	**13.2**	4.1	17.1	0.25	0.74	0.19	10 or SB	1000	2.5	4.3
Chromium	**553**	168	101	674	10.6	11.7	6.8	50 or SB	310000	30	180
Cobalt	45.2	16.8	13.4	42.1	5.2	2.5	3.3	30 or SB	120000	NS	NS
Copper	**4310**	**10000**	**450**	122	11.1	23.7	6.4	25 or SB	82000	50	270
Iron	115000	115000	57200	525600	10100	9170	7170	2000 or SB	610000	NS	NS
Lead	**1390**	**2730**	**740**	**7590**	7.3	49.5	6.6	400*	NS	63	400
Mercury	0.15	**0.19**	0.15	U	U	U	U	0.1	NS	0.18	0.81
Nickel	107	90.6	82.1	98.5	9.6	6.9	5.2	13 or SB	41000	30	310
Selenium	4.7	6.5	4.5	20.8	U	U	U	2 or SB	10000	3.9	180
Zinc	2350	3250	1070	32.5	20.5	98.4	17.5	20 or SB	610000	109	10000

Results obtained from *"Phase II Environmental Site Assessment Report"* December 2000

Anglers Club Soil Sample Results

Sample ID	AC-SS-1	AC-SS-3	AC-SS-2	AC-P-1	AC-P-2	AC-P-4	TAGM Value	USEPA Risk Based Concentration	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	0-0.5	0-0.5	0-0.5	5-7	1-3	4-6				
Date Collected	4/12/2000	4/12/2000	4/12/2000	4/12/2000	4/12/2000	4/12/2000				
Semivolatile Organics (ug/Kg)										
Benzo (a) anthracene	U	340 J	U	NS	NS	NS	224 or MDL	7800	1000	1000
Chrysene	U	480	U	NS	NS	NS	400	780000	1000	3900
Benzo (a) pyrene	U	370 J	U	U	140 J	120 J	61 or MDL	780	1000	1000
Dibenzo (a,h) anthracene	U	110 J	U	NS	NS	NS	14 or MDL	780	330	330
Metals (mg/Kg)										
Arsenic	9.5	9.2	**221**	1.4 B	8.5	4.4	7.5 or SB	3.8	13	16
Barium	30.1 B	37.4 B	**485**	8.5	118	77.3	300 or SB	140000	350	400
Beryllium	0.16 B	0.25 B	0.31 B	0.27 B	0.36 B	0.31 B	0.16 or SB	4100	7.2	72
Cadmium	0.98 B	**15.4**	**35.9**	0.23	0.59	0.64	10 or SB	1000	2.5	4.3
Cobalt	5.4 B	7.1 B	46.2	3.7	4.6	5.2	30 or SB	120000	NS	NS
Copper	156	51.2	**636**	6.7	29.4	30.8	25 or SB	82000	50	270
Iron	9370	20500	54600	7950	9160	8810	2000 or SB	610000	NS	NS
Lead	78.8	135	**4460**	4.7	190	**585**	400*		63	400
Mercury	0.59	0.2	0.48	U	0.16	0.27	0.1		0.18	0.81
Nickel	8.3	14.1	**5832**	5.6	8.4	7.1	13 or SB	41000	30	310
Selenium	U	1.2	16.5	U	0.89	2.2	2 or SB	10000	3.9	180
Zinc	173	691	4290	28.2	201	326	20 or SB	610000	109	10000

Results obtained from *"Phase II Environmental Site Assessment Report"* December 2000

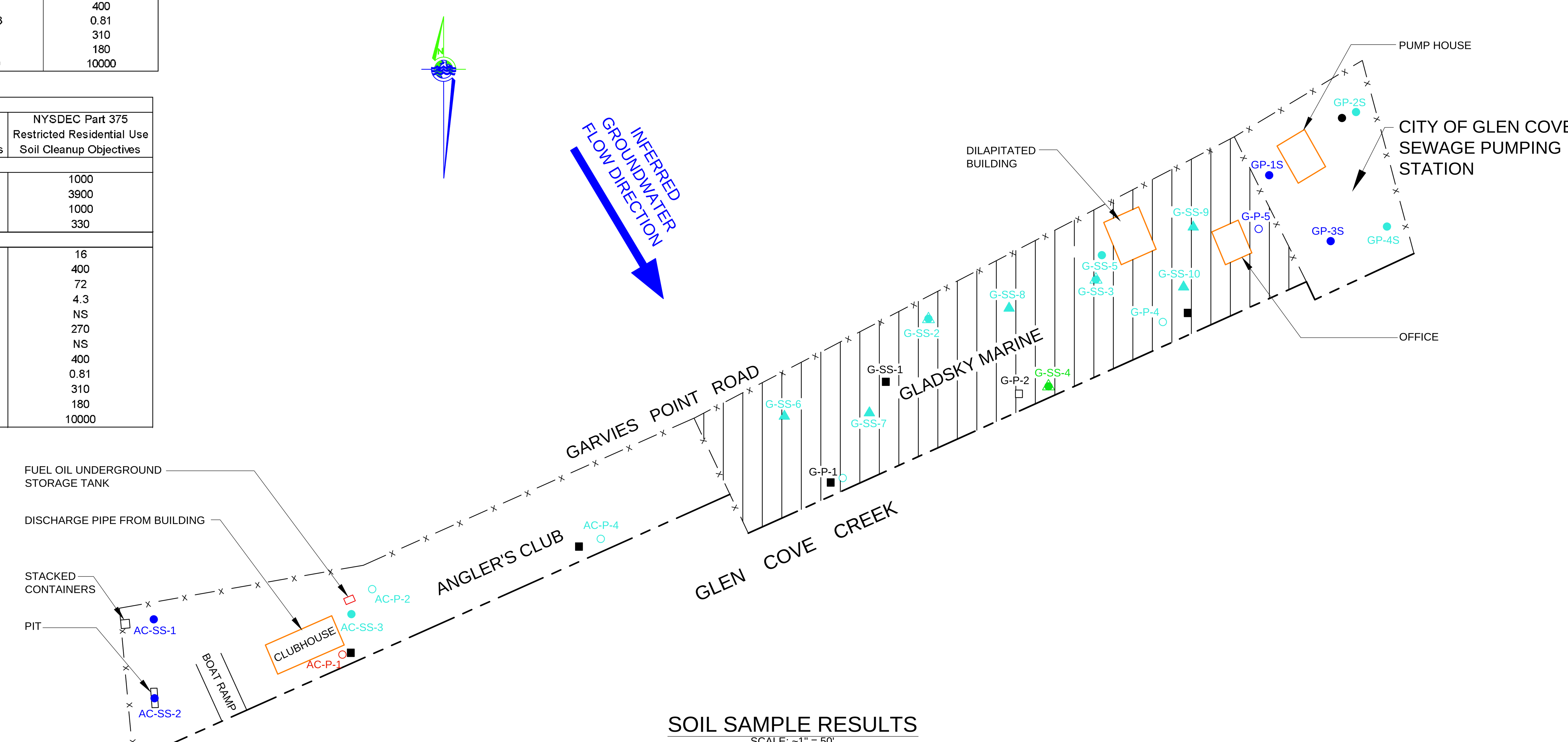
Pump Station Soil Sample Results

Sample ID	GP-1S	GP-2S	GP-2S	GP-3S	GP-3S	GP-4S	TAGM Value	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objectives
Depth (ft)	5-7	0-0.5	1.5-2	0-0.5	1.5-2	11-12			
Date Collected	12/2/2004	12/2/2004	12/2/2004	12/2/2004	12/2/2004	12/22004			
Semivolatile Organics (ug/Kg)									
Benzo (a) anthracene	U	310J	48J	37J	51J	130J	224 or MDL	1000	1000
Benzo (a) pyrene	U	260J	U	U	U	76J	61 or MDL	1000	1000
Metals (mg/Kg)									
Arsenic	4.6	**31.4**	**27.2**	1.3B	1.5B	8.6	7.5 or SB	13	16
Copper	41.4	42.1	39.9	2.5B	3.4B	19.7	25 or SB	50	270
Iron	16,900	11,800	10,400	2,140	2,650	6,280	2,000 or SB	NS	NS
Mercury	U	0.39	0.13	U	U	U	0.1	0.18	0.81
Zinc	37.5	112	100	10.4	10.4	32.6	20 or SB	109	10000

Results obtained from *"Phase II Environmental Site Assessment Report DRAFT"* January 2005

LEGEND

- AREA TO BE EXCAVATED MINIMUM OF 2 FEET NYSDEC PROPOSED REMEDIAL ACTION PLAN DUE TO METALS, SVOCs
- SURFACE SOIL SAMPLE LOCATION (INITIAL PHASE II ESA)
- SUBSURFACE SOIL SAMPLE LOCATION (INITIAL PHASE II ESA)
- SURFACE SOIL SAMPLE LOCATION (INITIAL PHASE II ESA) (ASBESTOS ANALYSIS ONLY)
- SUBSURFACE SOIL SAMPLE LOCATION (INITIAL PHASE II ESA) (ASBESTOS ANALYSIS ONLY)
- SUPPLEMENTAL PHASE II ESA SOIL SAMPLE LOCATION (0-6",6-12",12-18")
- SUPPLEMENTAL PHASE II ESA SOIL SAMPLE LOCATION (6-12",12-18")
- EXCEEDS METALS
- EXCEEDS METALS AND SVOC
- EXCEEDS METALS AND VOC
- EXCEEDS METALS, SVOC AND PCB



SOIL SAMPLE RESULTS

SCALE: ~1" = 50'

0 50 100
SCALE: ~1" = 50'

Notes:
Concentration Exceeds TAGM Recommended Cleanup Objectives
Concentration Exceeds USEPA Region III Risk-Based Concentration for Industrial Land Use
Concentration Exceeds NYSDEC Part 375 Restricted Residential Use Recommended Cleanup Objectives
U: Compound analyzed for but not detected
B: Concentration is between instrument detection limit and contract required detection limit
J: Compound found at concentration below the CRDL, value estimated
NS: No Standard
* Average background levels for lead in metropolitan or suburban areas or near highways typically range from 200-500 ppm
Results obtained from *"Supplemental Phase II Environmental Site Assessment Report"* September 2002

INFORMATION PROVIDED BY:
PHASE I & PHASE II ESA'S PREPARED
FOR THE CITY OF GLEN COVE BY
DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 4A Anglers Gladsky 2-4-09.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR

RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/8/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

ANGLERS CLUB,
GLADSKY MARINE & PUMP STATION
SOIL SAMPLE RESULTS

GLEN ISLE WATERFRONT
REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 4A

2000 PHASE II ESA RESULTS

Anglers Club Groundwater Sample Results					
Sample ID Date Sampled	AC-P-1-GW 4/12/2000	AC-P-2-GW 4/12/2000	AC-P-3-GW 4/12/2000	AC-P-4-GW 4/12/2000	Class GA Groundwater Standard
Volatile Organics (ug/Kg)					
Bromomethane	**43**	U	U	U	5
1,1-Dichloroethene	**23**	U	U	U	5
1,1-Dichloroethane	**530 D**	U	U	U	5
1,2-Dichcloroethane	**3 J**	U	U	U	0.6
1,1,1-Trichloroethane	**8 J**	U	U	U	5
Trichloroethene	**170 D**	3 J	U	U	5
Tetrachloroethene	**300 D**	1 J	U	U	5
Metals (mg/Kg)					
Antimony (total)	U	U	U	U	3
Antimony (dissolved)	**3.1 B**	**6.0 B**	**5.7 B**	**7.2 B**	3
Arsenic (total)	**32.5**	8.6 B	**44.7**	**42**	25
Arsenic (dissolved)	3.7 B	5.4 B	5.9 B	5.4	25
Beryllium (total)	**4.2 B**	2.2 B	**6.5**	**8.2**	3 GV
Beryllium (dissolved)	U	U	U	U	3 GV
Cadmium (total)	**7.9**	0.55 B	3.2 B	**9.7**	5
Cadmium (dissolved)	U	U	U	0.55 B	5
Chromium (total)	**269**	**116**	**227**	**417**	50
Chromium (dissolved)	2.6 B	U	U	U	50
Copper (total)	**277**	48.4	126	179	200
Copper (dissolved)	2.6 B	2.7 B	4.7 B	6.3 B	200
Iron (total)	**84300**	**45600**	**139000**	**294000**	300
Iron (dissolved)	20.5 B	118	29.8 B	29.4 B	300
Lead (total)	**510**	**27.5**	**94.0**	**103**	25
Lead (dissolved)	U	U	U	U	25
Magnesium (total)	27500	18000	**17300**	**133000**	35000 GV
Magnesium (dissolved)	19000	13900	8510	**136000**	35000 GV
Manganese (total)	**47100**	**1710**	**1300**	**1260**	300
Manganese (dissolved)	**5680**	**1170**	62.6	218	300
Nickel (total)	**260**	71.9	**152**	**265**	100
Nickel (dissolved)	26.6 B	5.4 B	U	6.7 B	100
Selenium (total)	U	U	U	**13.4**	10
Selenium (dissolved)	U	8.9	7	**12.9**	10
Sodium (total)	**119000**	**37800**	**725000**	**876000**	20000
Sodium (dissolved)	**122000**	**35700**	**729000**	**12300000**	20000
Thalium (total)	**36.6**	U	U	U	0.5 GV
Thalium (dissolved)	U	U	U	U	0.5 GV

Results obtained from *"Phase II Environmental Site Assessment Report"* December 2000

2000 PHASE II ESA RESULTS

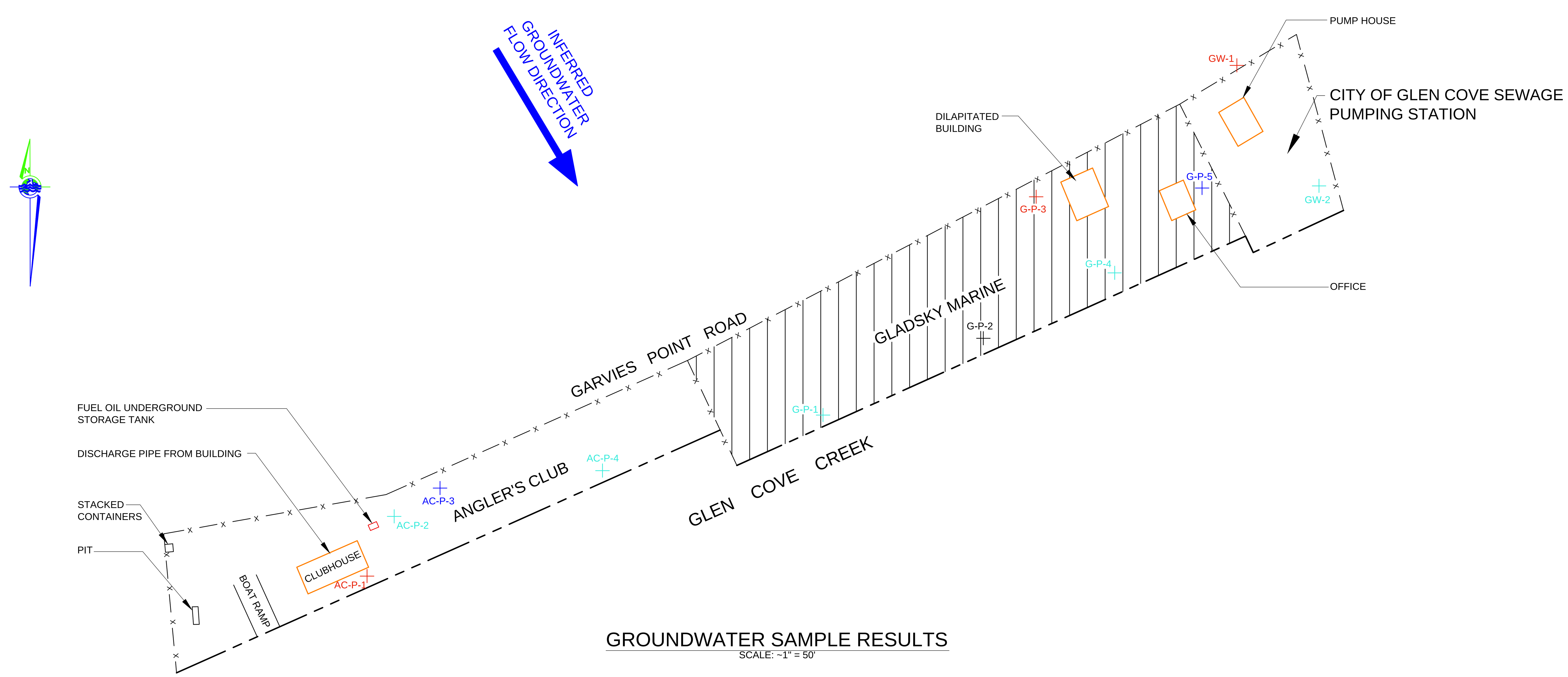
Gladsky Groundwater Sample Results						
Sample ID Date Sampled	G-P-1-GW 4/12/2000	G-P-2-GW 4/12/2000	G-P-3-GW 4/13/2008	G-P-4-GW 4/13/2008	G-P-5-GW 4/13/2008	Class GA Groundwater Standard
Volatile Organics (ug/L)						
Vinyl Chloride	U	U	**10**	U	U	2
1,1-Dichloroethane	U	U	**7 J**	U	U	5
1,2-Dichcloroethene (total)	U	U	**51**	U	1 J	0.6
Trichloroethene	U	U	**36**	U	U	5
Metals (ug/L)						
Antimony (total)	U	U	U	U	**28.1 B**	3
Antimony (dissolved)	U	U	**3.5 B**	**4.4 B**	**5 B**	3
Arsenic (total)	8 B	14.9	**40.5**	U	**23.8**	25
Arsenic (dissolved)	5 B	U	U	U	U	25
Barium (total)	42.5 B	105 B	**964**	86.3 B	**2720**	1000
Barium (dissolved)	14.3 B	U	49.1 B	55.1 B	62.5 B	1000
Beryllium (total)	0.59 B	2.4 B	**7.5**	U	**29.3**	3 GV
Beryllium (dissolved)	U	U	U	U	U	3 GV
Cadmium (total)	0.92	1.7 B	**10.1**	U	**27.2**	5
Cadmium (dissolved)	U	U	0.69 B	U	U	5
Chromium (total)	43	**168**	**346**	24.4	**731**	50
Chromium (dissolved)	U	U	12.3	2.1 B	U	50
Copper (total)	66.2	51.5	**530**	6.4 B	**495**	200
Copper (dissolved)	4.5 B	U	4.7 B	2.7 B	U	200
Iron (total)	**24200**	**82900**	**266000**	**5250**	**1230000**	300
Iron (dissolved)	**1080**	**5380**	32.5 B	**2610**	**3360**	300
Lead (total)	**90.4**	53	**159**	5.1	**391**	25
Lead (dissolved)	U	U	4.1	U	2.1 B	25
Magnesium (total)	**42200**	**36800**	**28400**	**49000**	**99700**	35000 GV
Magnesium (dissolved)	**40200**	23500	16600	**47500**	24800	35000 GV
Manganese (total)	**461**	**1820**	**41700**	**2480**	**5350**	300
Manganese (dissolved)	**348**	**935**	**16500**	**2520**	**577**	300
Mercury (total)	U	U	**0.91**	U	U	0.7
Mercury (dissolved)	U	U	U	U	U	0.7
Nickel (total)	33.2 B	79.5	**300**	12.7 B	**649**	100
Nickel (dissolved)	4.6 B	3.2 B	34.1 B	U	4.9 B	100
Selenium (total)	8.8	9.9	**21.8**	U	**27.1**	10
Selenium (dissolved)	6.6	U	U	U	U	10
Sodium (total)	**300000**	**43500**	**66600**	**405000**	**125000**	20000
Sodium (dissolved)	**307000**	**25500**	**66700**	**417000**	**137000**	20000
Thalium (total)	U	U	**35.8**	U	U	0.5 GV
Thalium (dissolved)	U	U	**16.2**	U	U	0.5 GV

Results obtained from *"Phase II Environmental Site Assessment Report"* December 2000

2000 PHASE II ESA RESULTS

Pump Station Groundwater Sample Results			
Sample ID Depth (ft) Date Collected	GW-1 18-20 12/2/2004	GW-2 8-12 12/2/2004	NYSDEC Class GA Standard
Volatile Organics (ug/L)			
Vinyl Chloride	**13**	U	2 ST
cis-1,2-Dichloroethene	**230D**	5 J	5 ST
Trichloroethene	**10**	U	5 ST
Semivolatile Organics (ug/L)			
Florene	U	**100 J**	50 GV
Metals (mg/L)			
Antimony (total)	**7.3**	U	3 ST
Antimony (dissolved)	**5.6 B**	U	3 ST
Arsenic (total)	**125 B**	**330**	25 ST
Arsenic (dissolved)	**58**	**28.8**	25 ST
Beryllium (total)	**4.3 B**	2.3 B	3 GV
Cadmium (total)	**U**	**16.8**	5 ST
Chromium (total)	**367**	**1,130**	50 ST
Copper (total)	**364**	**1,740**	200 ST
Iron (total)	**687,000**	**2,000,000**	300 ST*
Iron (dissolved)	**455,000**	**28,100**	300 ST*
Lead (total)	**112**	**297**	25 ST
Magnesium (total)	**69,500**	28,800	35,000 GV
Magnesium (dissolved)	**60,400**	13,900	35,000 GV
Manganese (total)	**10,200**	**3,300**	300 ST*
Manganese (dissolved)	**9,100**	**1,940**	300 ST*
Nickel (total)	**272**	**643**	100 ST
Nickel (dissolved)	**114**	15.5 B	100 ST
Silver (total)	**114**	**91.8**	50 ST
Sodium (total)	**813,000**	**155,000**	20,000 ST
Sodium (dissolved)	**836,000**	**149,000**	20,000 ST
Thallium (total)	**67.2**	**19.4**	0.5 GV
Thallium (dissolved)	**47.9**	**3 B**	0.5 GV

Results obtained from *"Phase II Environmental Site Assessment Report DRAFT"* January 2005



GROUNDWATER SAMPLE RESULTS
SCALE: ~1" = 50'

LEGEND

- AREA TO BE EXCAVATED MINIMUM OF 2 FEET NYSDEC PROPOSED REMEDIAL ACTION PLAN DUE TO METALS, SVOCs
- GROUNDWATER SAMPLE LOCATION (INITIAL PHASE II ESA)
- EXCEEDS METALS
- EXCEEDS METALS AND SVOC
- EXCEEDS METALS AND VOC
- EXCEEDS METALS, SVOC AND PCB

Notes:
Concetration Exceeds Groundwater Standard or Guidance Value
U: Compound analyzed for but not detected
B Concentration is between instrument detection limit and contract required detection limit
J: Compound found below CRDL; value estimated
D: Result obtained from analysis at a secondary dilution
ST: Standard
GV: Guidance Value
* Standard applies to the sum of iron and manganese
NA: Not analyzed
Results obtained from *"Supplemental Phase II Environmental Site Assessment Report"* September 2002

0 50 100
SCALE: ~1" = 50'

INFORMATION PROVIDED BY:
PHASE I & PHASE II ESA'S PREPARED FOR THE CITY OF GLEN COVE BY DVIRKA AND BARTILUCCI CONSULTING ENGINEERS

J:\Projects M-R\RGI0801 - Glen Cove Waterfront\DGEIS ENV Section\cad\Fig 4B Anglers Gladsky 2-4-09.dwg

PWGC
Strategic Environmental & Engineering Solutions
630 JOHNSON AVE. • SUITE 7
BOHEMIA • NY • 11716-2618
PH: (631)589-6353 • FX: (631)589-8705
E-MAIL: INFO@PWGROSSER.COM

CONSULTANTS

DRAWINGS PREPARED FOR
RXR
GLEN ISLE PARTNERS, LLC

REVISIONS	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT: RGI0801	APPROVED BY: LS
DESIGNED BY: BB	DATE: 1/8/09
DRAWN BY: LLG	SCALE: AS SHOWN

SHEET TITLE

ANGLERS CLUB, GLADSKY MARINE & PUMP STATION GROUNDWATER SAMPLE RESULTS

GLEN ISLE WATERFRONT REVITALIZATION PROJECT
GLEN COVE, NY

FIGURE NO 4B

SHEET 13 OF 14

APPENDIX A

CUT / FILL MAPS

REV. / ISSUE	DATE	BY	CHK	DESCRIPTION
1	10/01/12	LMF	PAR	PUD SITE PLAN SUBMISSION

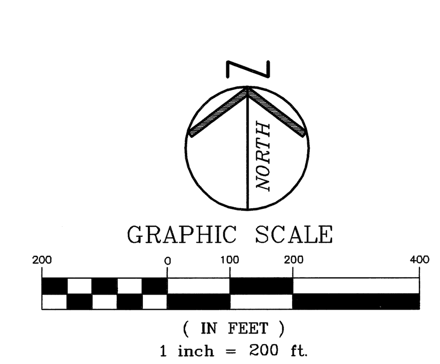
CONSULTANT

lessard DESIGN INC. P.C.
8521 Leesburg Pike, Suite 700
Vienna, VA 22182
P. 571.830.1800
F. 571.830.1801

CONSULTANT

MPFP
M. PAUL FRIEDBERG & PARTNERS / MPFP LLC
41 East 11th Street
New York, New York 10003
tele. 212. 477. 6366
fax. 212. 477. 6548

ORIENTATION / KEY PLAN



PS&S
integrating design & engineering
PAULUS, SOKOLOWSKI AND SARTOR, PC
67A MOUNTAIN BOULEVARD EXTENSION
P.O. BOX 4039
WARREN, NEW JERSEY 07059
PHONE: (732) 560-9700
FAX: (732) 560-9768

IT IS A VIOLATION OF NYS EDUCATION LAW, ARTICLE 145 SECTION 7209.2, FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE SEAL OF AN ENGINEER OR LAND SURVEYOR IS ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

ALL DIMENSIONS MUST BE VERIFIED BY THE CONTRACTOR. NOTIFY PAULUS, SOKOLOWSKI AND SARTOR, LLC. OF ANY CONFLICTS, ERRORS, AMBIGUITIES OR DISCREPANCIES IN THE CONTRACT DRAWINGS OR SPECIFICATIONS BEFORE PROCEEDING WITH CONSTRUCTION.

ALL DIMENSIONS SHALL BE AS NOTED IN WORDS OR NUMBERS ON THE CONTRACT DRAWINGS. DO NOT SCALE THE DRAWINGS TO DETERMINE DIMENSIONS.

THESE CONTRACT DRAWINGS CONTAIN DATA INTENDED SPECIFICALLY FOR THE NOTED PROJECT AND CLIENT. THEY ARE NOT INTENDED FOR USE ON EXTENSIONS OF THIS PROJECT OR FOR REUSE ON ANY OTHER PROJECT.

THE COPYING AND/OR MODIFICATION OF THIS DOCUMENT OR ANY PORTION THEREOF WITHOUT THE WRITTEN PERMISSION OF PAULUS, SOKOLOWSKI AND SARTOR, LLC. IS PROHIBITED.

UNLESS THESE DRAWINGS ARE SPECIFICALLY DESIGNATED AS "CONSTRUCTION ISSUE", THESE DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION OR IMPROVEMENTS DEPICTED HEREIN. CONTRACTORS SHALL NOTIFY THE DESIGN ENGINEER TO OBTAIN CONSTRUCTION DOCUMENTS.

JOSEPH J. FLEMING, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 66591

SIGNATURE 9/27/2012 DATE

CLIENT

RXR GLEN ISLE PARTNERS LLC

PROJECT

GLEN ISLE WATERFRONT REDEVELOPMENT PHASE I

CITY OF GLEN COVE, NASSAU COUNTY, NEW YORK

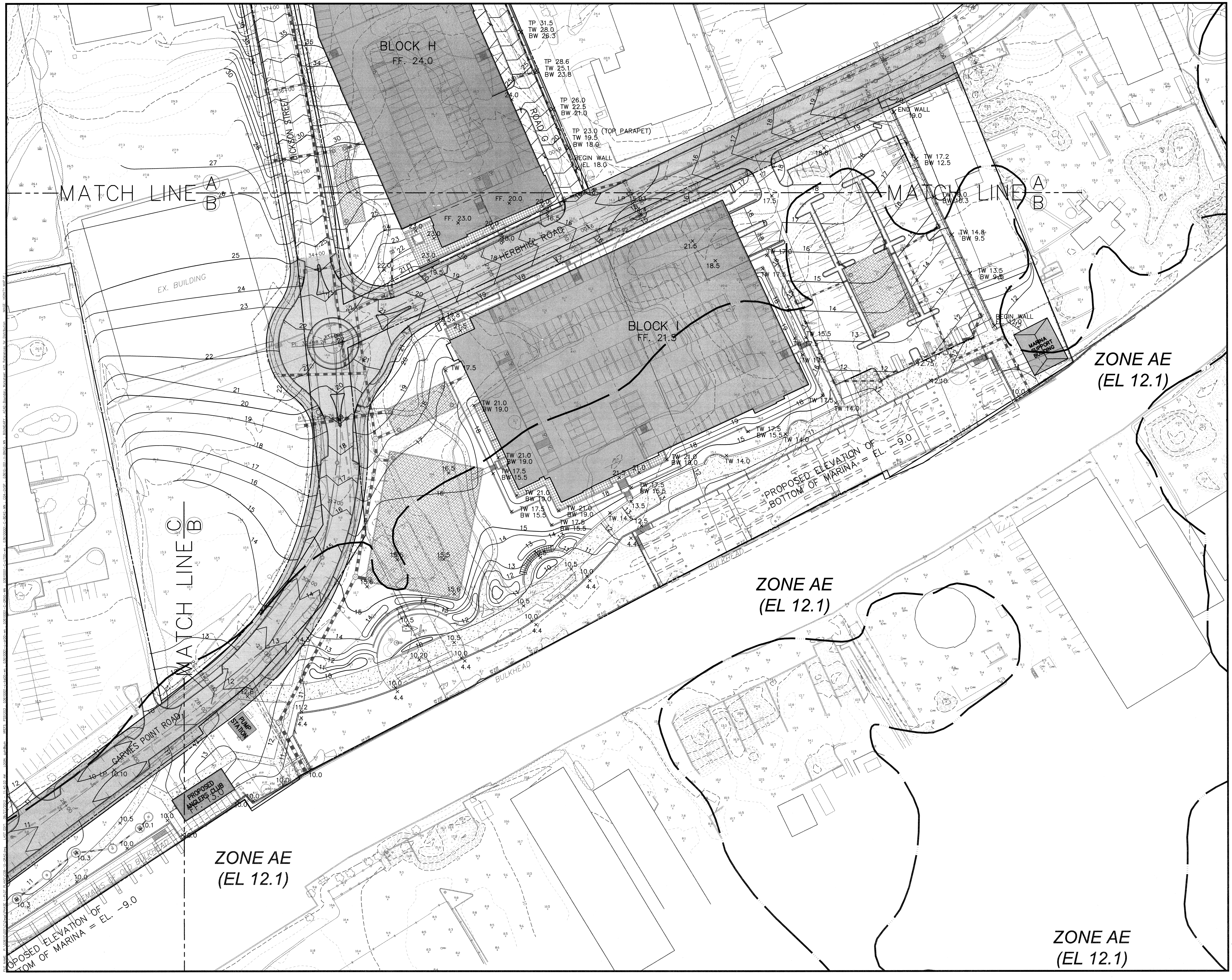
SHEET TITLE

GRADING PLAN A

JOB NO.: 03610-0001
DATE: 9/27/2012
DRAWN: GY
CHECK: PAR
SCALE: 1"=40'

BINDING ORDER:
SHEET OF
SHEET NO.

C-8



REV. / ISSUE	DATE	BY	CHK	DESCRIPTION
1	10/01/12	LMF	PAR	PUD SITE PLAN SUBMISSION

CONSULTANT

lessard DESIGN INC. P.C.
8521 Leesburg Pike, Suite 700
Vienna, VA 22182
P. 571.830.1800
F. 571.830.1801

CONSULTANT

MPFP
M. PAUL FRIEDBERG & PARTNERS / MPFP LLC
41 East 11th Street
New York, New York 10003
tele. 212.477.6366
fax. 212.477.6548

ORIENTATION / KEY PLAN

NORTH

GRAPHIC SCALE

(IN FEET)
1 inch = 200 ft.

PS&S
integrating design & engineering
PAULUS, SOKOLOWSKI AND SARTOR, PC
67A MOUNTAIN BOULEVARD EXTENSION
P.O. BOX 4039
WARREN, NEW JERSEY 07059
PHONE: (732) 560-9700
FAX: (732) 560-9768

JOSEPH J. FLEMING, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 66591

SIGNATURE 9/27/2012 DATE

CLIENT

RXR GLEN ISLE PARTNERS LLC

PROJECT

GLEN ISLE
WATERFRONT
REDEVELOPMENT
PHASE I

CITY OF GLEN COVE, NASSAU COUNTY, NEW YORK

SHEET TITLE

GRADING
PLAN B

JOB NO.: 03610-0001
DATE: 9/27/2012
DRAWN: GY
CHECK: PAR
SCALE: 1"=40'

BINDING ORDER:
SHEET OF
SHEET NO.

C-9

APPENDIX B

GLEN COVE FERRY TERMINAL SITE MANAGEMENT PLAN

– D R A F T –

SITE MANAGEMENT PLAN

GLEN COVE FERRY TERMINAL
CITY OF GLEN COVE
NASSAU COUNTY, NEW YORK

Prepared for:

CITY OF GLEN COVE INDUSTRIAL DEVELOPMENT AGENCY

JUNE 2009

♦PK5188\LL0602902(R01)

SITE MANAGEMENT PLAN
GLEN COVE FERRY TERMINAL
GLEN COVE, NEW YORK

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

List of Appendices

List of Figures

List of Tables

Section 1

1.0 INTRODUCTION

The Glen Cove Ferry Terminal project will be located on Garvies Point Road, Glen Cove, New York, at the eastern end of the former Captain's Cove Condominium site, adjacent to the Angler's Club (hereafter referred to as the "Site"), Nassau County, New York (Figure 1). Although the project will be constructed on a portion of the former Captain's Cove Condominium site that is a New York State Class 2 Inactive Hazardous Waste Disposal Site, this part of that property was remediated under the federal and state Superfund Programs, as part of the Li Tungsten and Captains Cove remediation. In general, the purpose of this Site Management Plan (SMP) is to ensure that the projected construction is performed in a manner consistent with the requirements identified in the Record of Decision (ROD) for the Captain's Cove site. Specifically, the purpose of this SMP document is to provide the details required to perform the projected construction while minimizing impacts to human health and the environment. This SMP will also guide construction activities in areas due to elevated levels of chemical contaminants in soil and/or groundwater.

This SMP has been prepared for the construction of the Glen Cove Ferry Terminal project – Phase 1 (Waterborne and Site Improvements). A second phase of the work – Phase 2 (Ferry Terminal Building Construction) – will be completed separately and site management activities associated with the building construction will be addressed at that time.

Major components of this SMP include the following:

- Institutional and Engineering Control Plan;
- Soil Management Plan;
- Quality Assurance, and
- Health and Safety

radioactive materials are present in the creek and to determine the extent of the petroleum-impacted sediment detected during the previous dredging program.

The radiological screening survey was performed over accessible areas from the eastern portion of the creek to the area of the Ferry Terminal project. Gross gamma readings were recorded and 11 discrete areas of elevated gamma readings were identified in areas to be dredged and areas previously dredged. Additional dredging of the creek was performed in 2004.

Section 2

2.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

The Institutional and Engineering Control Plan details the steps necessary to manage and implement the institutional and engineering controls for the site, consistent with the requirements of the ROD and NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation (DER-10), dated December 24, 2004.

The Institutional and Engineering Control Plan also identifies requirements to be placed on future site development activities within the restricted areas of the site. These requirements are necessary to ensure that any future activities at the site does not result in unacceptable exposure of contamination to the public and the environment.

2.1 Description of Institutional Control

An Institutional Control (IC) is any non-physical means of enforcing a restriction on the use of real property that limits human and environmental exposure, restricts the use of groundwater, provides notice to the potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of the remedial program or with the effectiveness and/or integrity of operation, maintenance or monitoring activities at or pertaining to the site. Types of IC include, but are not necessarily limited to, environmental easements, deed restrictions, discharge permits, site security (other than fencing), local permits, consent orders/decrees, zoning restrictions, hazardous waste site registry, deed notice, groundwater use restrictions, condemnation of property, and public health advisories.

Since the work described in this Site Management Plan only applies to the Ferry Terminal project, no institutional controls will be required for this work. Institutional controls for the entire Captain's Cove Condominium Site will be prepared in a separate Site Management Plan.

2.2 Description of Engineering Control

An Engineering Control (EC) is any physical barrier or method employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of the remedial program, or eliminate potential exposure pathways to contamination. Engineering controls include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation systems, fences, access controls, treatment and filtrations systems, and alternate water supplies.

Engineering controls including a sub-slab depressurization system are currently under design for the Ferry Terminal Project. A sub-slab depressurization system (SSDS) will be installed as part of the Glen Cove Ferry Terminal project – Phase 2 (Ferry Terminal Building Construction). The purpose of SSDS will be to collect vapors emitted from contaminated groundwater and/or soils and reduce the ability of these vapors from entering the building. The design of the SSDS will be done by the Terminal building designers, after the nature of the underlying soils is determined. In general, the SSDS will consist of a series of perforated pipes installed within a bed of permeable gravel that surrounds the piles and pile caps. Piping will be connected through a manifold that will ultimately be connected to an exhaust system. Impermeable barriers may also be installed on either the top and/or bottom of the permeable gravel bed. The Ferry Terminal building floor slab will be installed above the piping. The SSDS system will be installed as part of the Phase 2 (Ferry Terminal Building Construction) project. The final design of the SSDS will be provided to the NYS DEC prior to letting of the Phase 2 bid documents.

The Phase 1 project, as previously described, involves waterborne and site improvements (e.g., grading, utility installation, bulkhead work, landscaping, paving, etc.) and does not require the placement of any engineering controls.

Section 3

3.0 SOIL/SEDIMENT MANAGEMENT PLAN

The site is currently proposed to be utilized to implement transportation measures to provide improved access to the waterfront area abutting Glen Cove Creek. Since the potential for encountering contaminated soil/sediment exists during implementation of construction of the Ferry Terminal, activities that may result in the exposure of contamination must be handled in accordance with the Site Management Plan.

3.1 Sequencing of Work

Work to be completed at the site is anticipated to be completed in the following sequence:

- Excavate soil behind existing bulkhead to water level.
- Dismantle and remove shallow, buried barge.
- Install new, landward sheeting/bulkhead.
- Remove existing bulkhead.
- Dredge area seaward of new bulkhead to desired elevation

Work will be completed to minimize the potential for impacts to the Glen Cove Creek. Once the buried barge has been removed, endpoint samples shall be collected to ensure no residual contamination remains prior to removal of the existing bulkhead. Endpoint sampling is discussed below.

3.2 Sediment Sampling

Prior to the excavation of sediment in the Glen Cove Creek as part of the Ferry Terminal project, sediment samples will be collected to evaluate the quality of the sediment that will be left exposed after the dredging is completed.

For the construction of the Ferry Terminal, an estimated area of 17,800 square feet of the creek will be dredged approximately 2 feet below the existing creek bottom. As discussed in Section 1.2, the results of 17 sediment samples were used to evaluate dredging of the entire creek. Utilizing this rationale, while understanding that the area to be dredged as part of the Ferry Terminal project is adjacent to a NYSDEC Class 2 site, it is anticipated that the collection of up to 5 sediment samples should provide the necessary information to document sediment quality once sediment is dredged. One sample will be collected every 100 feet approximately 25 feet off the existing bulkhead within the area to be dredged. Sediment cores will be collected from the creek bottom to one foot below the proposed dredging depth (or approximately 3 feet deep). Each core will be inspected for visibly distinct layers. Since the sediment samples will be collected to document the quality of the sediment that will be left exposed after the dredging is complete, only the bottom 6-inch section of the core shall be sent to an off-site laboratory for chemical analysis. Cores will be photographed and screened for radiological contamination. Each sample will be analyzed for parameters listed in NYSDEC Region 1 Marine Habitat Protection sediment sampling guidance. (See Appendix A).

The results of the analysis will be provided to NYSDEC for review prior to commencement of dredging of the creek.

3.3 Excavation of Soil/Sediment

As discussed above, as part of the construction of the Ferry Terminal, soil and sediment will be excavated or dredged from the project site. Due to the potential for encountering contaminated soil and sediment, any soil excavation or sediment dredging required as part of the project must be handled appropriately and the NYSDEC will be notified prior to those excavation activities. A work plan will be developed by the Contractor prior to initiating any excavation activities at the site. The work plan, at a minimum, will be consistent with the requirement specified below for excavating/dredging, screening, handling, storing, sampling, transporting, and disposing of contaminated material. The work plan will also specify that any backfill material used on-site will be from an approved off-site source. No excavated material will be used as on-site backfill. The work plan will identify the procedures for testing and certifying the backfill material.

3.3.1 Excavation/Dredging

As part of the remedial activities performed as part of the Captain's Cove Condominium site in 2000, all excavated soil was subjected to environmental screening prior to staging on-site. Screening of all excavated soil and sediment for volatile organic compounds (VOCs) and radiological parameters was performed. A Radiation Monitoring Plan was prepared (see Appendix B) to assist the Contractor in performance of the required screening. The work to be performed at the Ferry Terminal project will follow the requirements of the Radiation Monitoring Plan with the following exceptions:

1. The scope of work presented in the Radiation Monitoring Plan for the Captain's Cove Condominium Site is not applicable to the Ferry Terminal project.
2. All excavated soil and sediment shall be screened and there shall be no exclusion for the upper three feet of soil.
3. Monitoring shall be performed for each two foot lift of soil excavated instead of three foot lift as discussed in the Radiation Monitoring Plan.

At a minimum, the following requirements apply to all excavations and dredging performed at the site:

1. Excavation shall be conducted in one area at a time.
2. The maximum size bucket to be used for excavation shall be 5 cubic yards.
3. Each bucket shall be screened for staining, discoloration, odors and screened for the presence of VOCs using a Photoionization Detector (PID) and radiation above background levels using a radiation rate meter/scaler.
4. Radiation screening of all excavated material shall be performed in accordance with the Radiation Monitoring Plan with the exceptions as noted above (see Appendix A). Excavated material that exceeds radiological screening criteria shall be stockpiled separately.

5. Screening results shall be made available to the on-site Engineer as the results are obtained.

6. Excavated materials shall be transported to a designated staging area for subsequent off-site disposal or directly loaded into trucks used to transport soil off-site for disposal.

7. Excavated materials must be staged on top of and covered with polyethylene sheeting. Ten (10) mil thick sheeting shall be used to cover the top of stockpiles. Forty (40) mil thick sheeting shall be placed beneath potentially or known contaminated material to prevent contact with undisturbed soils. Stockpiles must be constructed to isolate the contaminated material from the environment.

8. Diversion measures must be employed to prevent storm water run-on and run-off to the stock piles.

9. Roll-off or equivalent units used to store contaminated material must be water tight.

10. Individual stockpiles shall not exceed a volume of 500 cubic yards.

11. Excavated soil shall not be spread or permanently stored on-site.

12. Excavation shall be performed in a manner that will prevent spills and the potential for contaminated soil to be mixed with uncontaminated material.

13. Excavation shall be accomplished by methods which preserve the undisturbed state of subsurface soils.

14. Mobilization of the excavated soil shall be prevented through the use of polyethylene sheeting to cover any soil stockpiles or by using appropriate soil erosion control methods established at the end of each day of excavation activities.

15. At a minimum, one representative sample for each 500 cubic yard stockpile of material that exceeds radiological screening criteria shall be collected. Each sample shall be analyzed for target radionuclides (uranium, thorium and their decay progency) by standard gamma spectroscopy (i.e., United States Department of Energy {USDOE} Method EML-HASL-300 or equivalent). During analysis of radionuclides, the analyzer gain shall be set so that the measured energy range will be from approximately 25keV to approximately 2 MeV with about 0.5 keV per channel (assuming the analyzser is set for 4096 channels). Count times and sample size/geometry shall be able to produce detection limits of 0.1 pCi/g for the radionuclides: Ac-228, Pb-212, Bi-212, Tl-208, Ra-226/U-235, Pb-214, Bi-214; 1 pCi/g for U-235; and 10 pCi/g for Pa-234m. All other quantified radionuclides will be reported. The complete computer-generated gamma spectrum analysis will be supplied to the oversight Engineer. Samples to be analyzed for radionuclides shall be dried samples and will be analyzed before activities of the Ra-226 and its daughter products have returned to equilibrium, the Ra-226/U-235 peak shall be reported as Ra-226.

3.3.2 Endpoint Sampling

Excavation endpoint samples shall be performed in each excavation as part of the Ferry Terminal project. Endpoint samples will be performed in accordance with NYSDEC Division of Environmental Remedial (DER-10) Technical Guidance for Site Investigation and Remediation. For excavations 20 to 300 feet in perimeter:

1. One sample will be collected from the top of each sidewall for every 30 feet of sidewall (if applicable)
2. One sample will be collected from the excavation bottom for every 900 square feet of bottom area.

For excavations greater than 300 feet in perimeter, the proposed sampling frequency considered adequate for documentation of the effectiveness of the soil removal will consist of the following:

1. One sample will be collected from the top of each sidewall for every 100 linear feet of sidewall.
2. One sample will be collected from the excavation bottom for every 2,500 square feet of bottom area.

The Contractor will be required to collect enough volume of soil to split that samples, if requested. Samples shall be sent to the laboratory for analysis via overnight shipment. The laboratory shall analyze the samples within 24 hours. The results of the analysis shall be emailed, telecopied or telephoned to the Contractor who shall report the results to the oversight Engineer within 4 hours after receipt. All samples shall be analyzed for metals in accordance with NYSDEC ASP Method 6010 and in accordance with the Contractor prepared sampling plan. Since the area will have been screened to document no residual radiological contamination, no endpoint samples shall be collected for radiological analysis. Backfill and compaction will not be conducted until satisfactory endpoint sample results are obtained and reviewed and approved by NYSDEC.

3.3.3 Waste Transportation and Disposal

The following requirements apply to the transportation and disposal of material excavated from the site:

1. Sampling, classification, manifesting, labeling, transporting and disposing of material must be performed in accordance with all applicable federal, state, and local laws and regulations.
2. Materials removed from the site must be transported directly to the disposal facility.
3. Sampling frequency, analysis methods, and analytical laboratory must be approved by the NYSDEC prior to removal of any material from the site.
4. Letters of commitment must be obtained from disposal facilities to be used during the project. The letters should state that the disposal facility is permitted to accept and has the available capacity to receive the waste that will be shipped from the site.
5. All vehicles must be decontaminated prior to leaving the site.

3.3.4 Backfill

The following minimum requirements apply to the fill material used to restore the site after excavation has been completed:

1. Fill must be uncontaminated pursuant to the remediation standards applicable to the site.
2. Documentation of the quality of the fill must be provided by a certification stating that it is clean material from a commercial or noncommercial source.
3. If documentation of the quality of the fill material can not be provided, a backfill evaluation proposal, which identifies material characterization protocols, shall be submitted to and approved by the NYSDEC prior to the use of any backfill material.

Further backfill requirements are provided in the Contract Documents.

3.4 Dewatering

Any dewatering activities required at the site must be handled appropriately and the NYSDEC will be notified prior to those activities. The Contractor performing the dewatering will be required to submit an application to NYSDEC for a "Dewatering Permit". The application shall be submitted after the Contractor submits the following information:

- The proposed starting date of the dewatering operation
- The name of the licensed well driller
- The details of the dewatering system to be installed
- The size, number and spacing of wells, well points, etc.
- The pump capacity, pumping rate and expected volume of water to be withdrawn
- The amount of water table drawdown
- Water quality information and proposed treatment required
- The final disposition of the water
- The expected duration of the operation
- All other requirements for a complete dewatering system

The Contractor shall be required to obtain all necessary permits including the NYSDEC Region 1 Well Permit and if necessary a NYSDEC State Pollutant Discharge Elimination System (SPDES) permit.

Section 4

4.0 QUALITY ASSURANCE

Environmental sample analysis conducted at the Site as part of the work will be performed in accordance with the NYSDEC 2000 Analytical Services Protocol (ASP) or latest revision. Prior to commencement of the work the Contractor shall be required to prepare a site specific quality assurance/quality control plan. This plan will provide the details with regard to the sampling and analysis required to perform the work.

4.1 Data Quality Requirements and Assessments

Data quality requirements and assessments are provided in the NYSDEC ASP, which includes the detection limit for each analyte and sample matrix. Note that the quantification limits, estimated accuracy, accuracy protocol, estimated precision and precision protocol are determined by the laboratory and will be in conformance with the requirements of the NYSDEC ASP (latest revision) and/or USEPA 5/99 SOW for organics and USEPA 1/00 SOW for inorganics, where applicable.

In addition to meeting the requirements provided in the NYSDEC ASP, the data must also be useful in evaluating the soil/sediment quality. Data obtained during the sampling will be compared to SCGs identified in the remedial action objectives. The SCGs to be used include:

Matrix	SCG
Soil	NYSDEC Part 375 Restricted Use-Commercial Soil Cleanup Objectives
Sediment	NYSDEC TOGS 5.1.9 – In-Water and Riparian Management of Sediment and Dredged Material

The methods of analysis will be in accordance with the NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this QAPP, but will be available upon request from the laboratory selected to perform the analysis. The laboratory will be New York Department of Health (NYSDOH) Environmental Laboratory Approved Program (ELAP) certified for organic and inorganic analyses.

4.1.1 Data Representativeness

Representative samples will be collected as follows:

- Soil – Samples will be obtained from the excavations. Samples will be collected using a dedicated polyethylene scoop.

- Sediment– Samples will be collected from creek bottom. Samples will be collected using a sediment core.

- Equipment Calibration – Field equipment will be calibrated daily before use according to the manufacturer's procedures.

- Equipment Decontamination – Non sterile sampling equipment will be decontaminated prior to use at each location according to the NYSDEC approved procedures described in Section 4.3.

4.1.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP certified laboratory and the NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

4.1.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for the project. The acceptability of less than 100% complete data, meeting all QA/QC protocols/standards, will be evaluated on a case-by-case basis.

4.2 Detailed Sampling Procedures

Two types of environmental samples will be collected from different locations as part of the work. These include soil and sediment samples. Sample locations will consist of soil stockpiles, suspected source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling area to keep equipment handling to a minimum.

4.3.1 Field Decontamination Procedures

All nondisposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling location and prior to leaving the Site). Different decontamination procedures are used for various types of equipment that perform the field activities as discussed below. When using field decontamination, it is advisable to start sampling in the area of the site with the lowest contaminant probability and proceed through to the areas of highest suspected contamination.

4.3.3 Decontamination Procedure for Sampling Equipment

Teflon, PVC, polyethylene, polystyrene and stainless steel sampling equipment decontamination procedures will be the following:

- Wash thoroughly with nonresidual nonionic anionic detergent (such as Alconox) and clean potable tap water using a brush to remove particulate matter or surface film.
- Rinse thoroughly with tap water.
- Rinse thoroughly with distilled water.
- Rinse in a well ventilated area with methanol (pesticide grade) and air dry.
- Rinse thoroughly with distilled water and air dry.
- Wrap completely in clean aluminum foil with dull side against the equipment. For small sampling items, such as scoops, decontamination will take place over a drum specifically used for this purpose.

The first step, a soap and water wash, is to remove all visible particulate matter and residual oils and grease. This is followed by a tap water rinse and a distilled/deionized water rinse to remove the detergent. Next, a high purity solvent rinse is designated for trace organics removal. Methanol has been chosen because it is not an analyte of concern in the Target Compound List (TCL). The solvent must be allowed to evaporate and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent. The aluminum wrap protects the equipment and keeps it clean until it is used at another sampling location.

4.4 Laboratory Sample Custody Procedures

A NYSDOH ELAP laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment will be used. The laboratory's standard operating procedures will be available upon request.

4.5 Field Management Documentation

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the monitoring plan and QAPP in an efficient and high quality manner. Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are to be composited (if required), preparing a Location Sketch, completing Sample Information Record Forms, Chain of Custody Forms, maintaining a daily Field Log Book, preparing Daily Field Activity Reports, completing Field Change Forms and filling out a Daily Air Monitoring Form. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the evidence was gathered and handled properly.

4.5.1 Location Sketch

Each sampling point shall have its own location sketch with permanent references, to the maximum extent practicable.

4.5.2 Sample Information Record

At each sampling location, the Sample Information Record Form is filled out and maintained including, but not limited to, the following information:

- Site name
- Sample crew
- Sample location
- Field sample identification number
- Date
- Time of sample collection
- Weather conditions
- Temperature
- Sample matrix
- Method of sample collection and any factor that may affect its quality adversely
- Field test results
- Constituents sampled
- Remarks (Sample Compositing Information)

4.5.3 Chain of Custody

The Chain of Custody (COC) is initiated at the laboratory with bottle preparation and shipment to the site. The COC remains with the sample at all times and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and appropriate handling of the bottles and samples. When the form is complete, it should indicate that there were no lapses in sample accountability.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession, or
- It is in the individual's view after being in his or her physical possession, or
- It is secured by the individual so that no one can tamper with it, or
- The individual puts it in a designated and identified secure area.

In general, Chain of Custody Forms are provided by the laboratory contracted to perform the analytical services. At a minimum, the following information shall be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Date
- Time
- Sample location
- Sample type
- Analysis requested
- Number of containers and volume taken
- Remarks
- Type of waste
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

For this particular study, forms provided by the laboratory will be utilized.

The Chain of Custody Form is filled out and signed by the person performing the sampling. The original of the form travels with the sample and is signed and dated each time the sample is relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler keeps one copy and a copy is retained for the project file. The sample container must also be labeled with an indelible marker with a minimum of the following information:

- Sample number
- Analysis to be performed
- Date of collection
- Compositing information

A copy of the completed form is returned by the laboratory with the analytical results.

4.5.4 Split Samples

Whenever samples are being split with another party, a Receipt for Samples Form must be completed and signed. A copy of the COC Form will accompany this form. The present work plan does not provide for split samples.

4.5.5 Field Log Book

Field log books must be bound and should have consecutively numbered, water resistant pages. All pertinent information regarding the site and sampling procedures must be documented. Notations should be made in log book fashion, noting the time and date of all entries. Information recorded in this notebook should include, but not be limited to, the following:

The first page of the log contains the following information:

- Project name and address
- Name, address and phone number of field contact

- Waste generator and address, if different from above
- Type of process (if known), generating waste
- Type of waste
- Suspected waste composition, including concentrations

Daily entries are made for the following information:

- Purpose of sampling
- Location of sampling point
- Number(s) and volume(s) of sample(s) taken
- Description of sampling point and sampling methodology
- Date and time of collection, arrival and departure
- Collector's sample identification number(s)
- Sample distribution and method of storage and transportation
- References, such as sketches of the sampling site or photographs of sample collection
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance), water levels, drilling logs, and organic vapor and dust readings
- Signature of personnel responsible for completing log entries.

4.5.6 Daily Field Activity Report

At the end of each day of field work, the Field Operations Manager, or designee, completes this form noting personnel on-site and summarizing the work performed that day, equipment, materials and supplies used, results of field analyses, problems and resolutions. This form is then signed and is subject to review.

4.5.7 Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, a Field Change Form must be completed.

4.6 Calibration Procedures and Preventative Maintenance

The following information regarding equipment will be maintained for the project:

1. Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be done daily at the sampling site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.
2. Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventive maintenance, in accordance with the NYSDEC ASP, for laboratory equipment is contained in the laboratory's standard operating procedures and is available upon request.

4.7 Performance of Field Audits

During field activities, the QA/QC officer may accompany sampling personnel into the field to verify that the site sampling program is being properly implemented and to detect and define problems so that corrective action can be taken. All findings will be documented and provided to the Field Operations Manager.

4.8 Control and Disposal of Contaminated Material

In general, soiled personal protective equipment (PPE) and disposable sampling equipment (i.e., bailers, tongue depressors, scoops) will be considered solid waste and contained and disposed off-Site. If hazardous waste contamination of PPE or disposable equipment is suspected, due to elevated measurements of screening instruments, visual observations, odors or other means, PPE and equipment will be drummed and secured on-site until a hazardous waste determination can be made. Once a determination has been made, an approved disposal method will be employed.

4.9 Documentation, Data Reduction and Reporting

A NYSDOH ELAP laboratory meeting requirements for documentation, data reduction and reporting will be used. All data will be cataloged according to sampling locations and sample identification nomenclature.

NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for VOA Analysis, B/N-A Analysis, Pesticides/PCB Analysis and Inorganic Analysis) will be completed and included with each data package. The sample tracking forms are required and supplied by the NYSDEC ASP.

4.10 Data Validation

Data validation will be performed in order to define and document analytical data quality in accordance with NYSDEC requirements that investigation data must be of known and acceptable quality. The analytical and validation processes will be conducted in conformance with the NYSDEC ASP and/or USEPA 5/99 and 1/00 SOWs.

Because the NYSDEC ASP is based on the USEPA CLP, the USEPA Functional Guidelines for Evaluating Organics Analyses for the Contract Laboratory Program (CLP) will assist in formulating standard operating procedures (SOPs) for the data validation process. The data validation process will ensure that all analytical requirements specific to the QA/QC plan are followed. Procedures will address validation of Routine Analytical Services (RAS) results based on the NYSDEC ASP Target Compound List and Target Analyte List for standard sample matrices.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results. The overall level of effort and specific data validation procedure to be used will be equivalent to a "100% validation" of all data in any given data package.

"Qualified" analytical results for any one field sample will be established and presented based on the results of specific QC samples and procedures associated with its sample analysis group or batch. Precision Accuracy criteria (i.e., QC acceptance limits) will be used in determining the need for qualifying data. Where test data have been reduced by the laboratory, the method of reduction will be discussed in the report. Reduction of laboratory measurements and laboratory reporting of analytical parameters will be verified in accordance with the procedures specified in the NYSDEC and USEPA program documents for each analytical method (i.e., recreate laboratory calculations and data reporting in accordance with the method specific procedure).

The standard operating guideline manuals for any specific analytical methodology required will specify documentation needs and technical criteria and will be taken into consideration in the validation process. Copies of the complete data package and the data validation report, including laboratory result data report sheets, with any qualifiers deemed appropriate by the data reviewer, and supplementary field QC sample result summary statement, will be provided.

The following is a description of the two-phased approach to data validation which will be used for this investigation. The first phase is called checklisting and the second phase is the analytical quality review, with the former being a subset of the latter.

- <u>Checklisting</u> – The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.
- <u>Analytical Data Review</u> – The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been preformed. Additionally, overall data quality and laboratory performance will be

evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Data Usability Summary Report (DUSR) will be prepared.

4.11 Performance and System Audits

A NYSDOH ELAP laboratory which has satisfactorily completed performance audits and performance evaluation samples shall be used.

4.12 Corrective Action

A NYSDOH ELAP laboratory shall meet the requirements for corrective action protocols, including sample "clean up" to attempt to eliminate/mitigate "matrix interference."

The NYSDEC ASP protocols include both mandatory and optional sample cleanup and extraction methods. GPC cleanup is required for soil samples by the NYSDEC ASP for semivolatile and pesticide/PCB analyses in order to meet contract required detection limits. Florisil column cleanup is required for the pesticide/PCB fraction of both soil and water samples. There are several optional cleanup and extraction methods noted in the NYSDEC ASP protocol. These include: Silica gel column cleanup, acid-base partition, steam distillation and sulfuric acid cleanup for PCB analysis.

It should be noted, that if these optional cleanup and extraction methods are requested by NYSDEC, holding time requirements should not be exceeded due to negligence of the laboratory.

4.13 Matrix Spikes/Matrix Spike Duplicates and Spiked Blanks

Matrix spike samples and blanks are quality control procedures, consistent with 6/00 NYSDEC ASP specifications, used by the laboratory as part of its internal Quality

Assurance/Quality Control program. The matrix and matrix spike duplicates are aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. They are used to evaluate the matrix effect of the sample upon the analytical methodology as well as to determine the precision of the analytical method used. A matrix spike blank is an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The MSB is subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedure and frequency regarding the MS, MSD and MSB are defined in the NYSDEC ASP.

4.14 Method Blanks

A method blank is an aliquot of laboratory water or soil which is spiked with the same internal and surrogate compounds as the samples. Its purpose is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the NYSDEC ASP as follows:

The laboratory shall prepare and analyze one laboratory reagent blank (method blank) for each group of samples of a similar matrix (for water or soil samples), extracted by a similar method (separatory funnel, continuous liquid extraction or sonication) and a similar concentration level (for volatile and semivolatile soil samples only) for the following, whichever is most frequent:

- Each case of field samples received; or
- Each 20 samples in a case, including matrix spikes and reanalyses; or
- Each 7 calendar day period during which field samples in a case were received (said period beginning with the receipt of the first sample in that sample delivery group); or
- Whenever samples are extracted.

Volatile analysis requires one method blank for each 12-hour time period when volatile target compounds are analyzed.

Semivolatile and pesticide method blanks shall be carried through the entire analytical process from extraction to final GC/MS or GC/EC analysis, including all protocol performance/ delivery requirements.

Section 5

5.0 HEALTH AND SAFETY

A site specific health and safety plan (HASP) for the work will be prepared by the Contractor. The HASP shall be consistent with the requirements of OSHA (29 CFR 1910 and 1926), federal, state and local authorities. The Contractor shall be required to monitor the health and safety conditions during all phases of the Work and fully enforce Contractor's HASP. The work to be performed will result in possible chemical and low-level radiation exposures. Therefore, Contractor shall be responsible to perform all work in accordance with the applicable regulatory requirements/recommendations of the NYSDEC, USEPA and OSHA.

All Contractor on-site personnel shall have completed OSHA training and medical monitoring requirements for work on hazardous waste sites.

The Contractor shall also be responsible for performing air monitoring for volatile organic compounds and particulates at both upwind and downwind locations to document real time levels of contamination which might be moving off-site in accordance with the New York State Department of Health (NYSDOH) Community Air Monitoring Plan (CAMP).

In addition, all remediation and subsequent construction activities shall be conducted pursuant to the findings and recommendations of the Emilcott Health Based Risk Assessment provided in Appendix C.

FIGURES

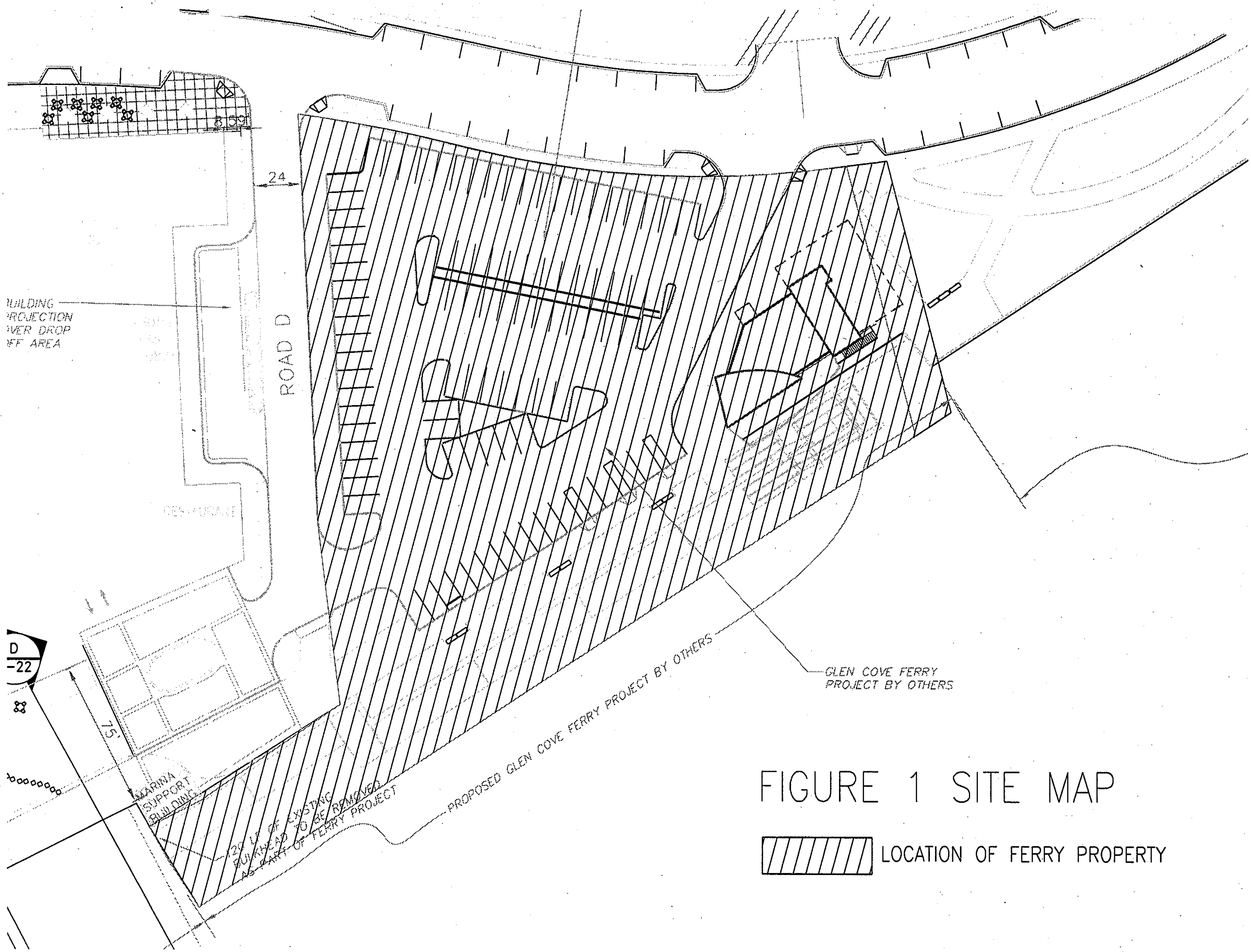


FIGURE 1 SITE MAP

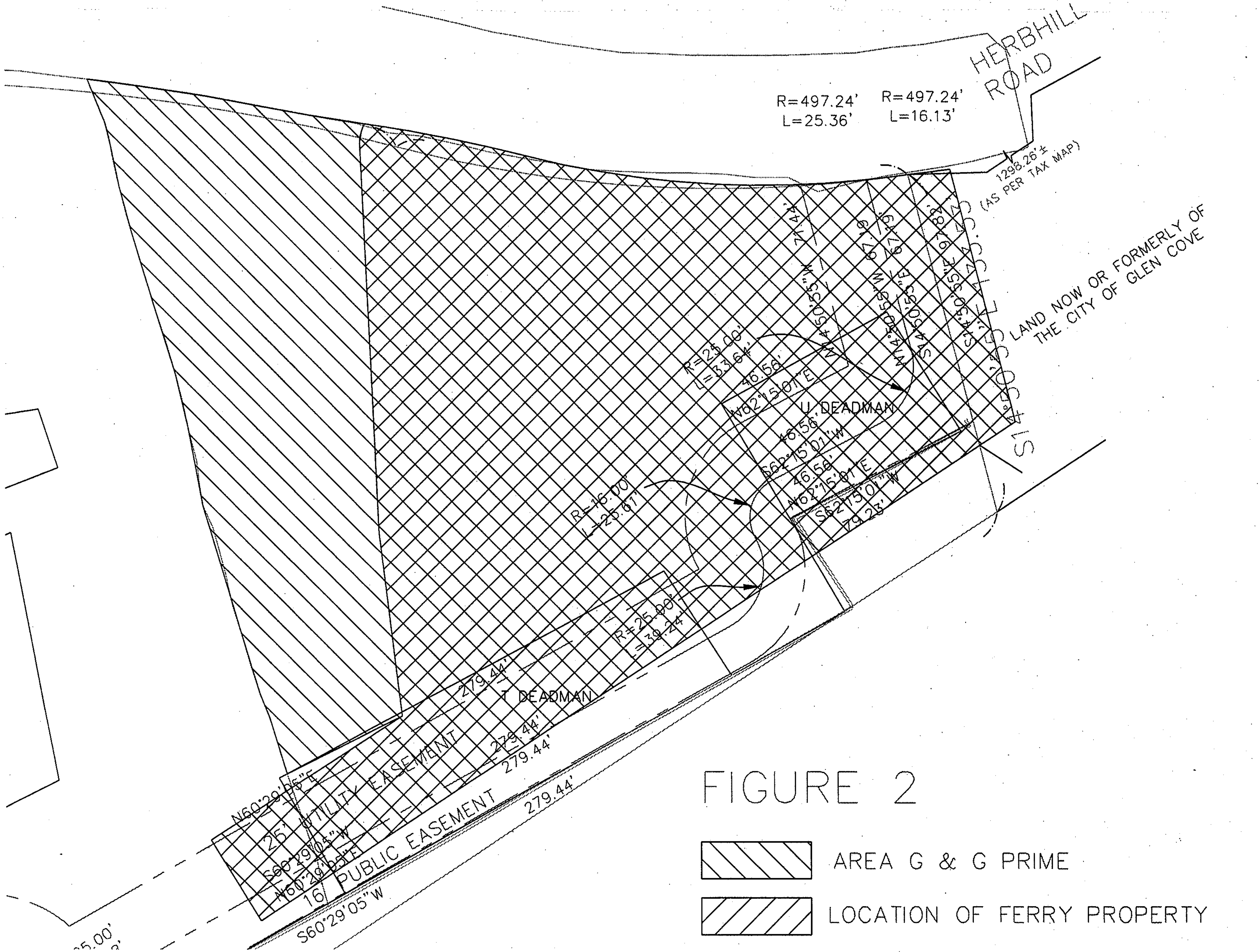

HERBHILL ROAD
R=497.24'
L=25.36'
R=497.24'
L=16.13'
1298.26'±
(AS PER TAX MAP)
LAND NOW OR FORMERLY OF
THE CITY OF GLEN COVE
R=25.00'
L=33.64'
46.56'
N62°15'01"E
U DEADMAN
46.56'
S62°15'01"W
46.56'
N62°15'01"E
S62°15'01"W
79.23'
N14°50'55"W 67.19'
S14°50'55"E 67.19'
S14°50'55"E 97.82'
N14°50'55"W 71.44'
R=16.00'
L=25.61'
R=25.00'
L=39.24'
T DEADMAN
279.44'
279.44'
279.44'
279.44'
25' UTILITY EASEMENT
N60°29'05"E
S60°29'05"W
N60°29'05"E
16' PUBLIC EASEMENT
S60°29'05"W
AREA G & G PRIME
LOCATION OF FERRY PROPERTY

FIGURE 2

SOURCE: GOOGLE EARTH GIS 2008

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

GLEN COVE FERRY TERMINAL
GLEN COVE, NASSAU COUNTY, NEW YORK
PHASE II ENVIRONMENTAL SITE ASSESSMENT

PROPOSED AREAS OF REMEDIATION MAP

N.T.S.

FIGURE 3

F:\2358\dwg\2358-01B glencove2(ST).dwg, Glencove 4, 6/3/2009 2:10:21 PM, TAntorino

Appendix A

APPENDIX A

NYSDEC REGION 1 MARINE HABITAT PROTECTION SEDIMENT SAMPLING GUIDANCE

Parameter Sediment/Soil	Suggested EPA Analytical Method CLP\RCRA	Recommended Method Detection Limit (mg/kg, ppm)
Arsenic	EPA 6010B	3.0
Mercury	EPA 6010B, 7470	0.2
Cadmium	EPA 6010B	1.0
Lead	EPA 6010B	2.0
Chromium	EPA 6010B	5.0
Nickel	EPA 6010B	5.0
Silver	EPA 6010B	0.2
Zinc	EPA 6010B	15
Copper	EPA 6010B	5.0
Chlordane	EPA 8081A	0.0017
Sum of DDT+DDE+DDD	EPA 8081A	0.0033
Dieldrin	EPA 8081A	0.0033
PCBs (sum of aroclors)	EPA 8082	0.033
Total PAH	EPA 8270	0.33
Total BTX	EPA 8021, 8260B	0.0008
Benzene	EPA 8021, 8260B	0.0003
Mirex	EPA 8081A	0.189
Dioxin (Toxic Equivalency Total)	EPA 1613B	0.000002

Physical Properties

Grain Size	ASTM D41/D42	
Total Organic Carbon	EPA 9060A	

Appendix B

APPENDIX B

RADIATION MONITORING PLAN

RADIATION MONITORING PLAN

Captain's Cove Condominium
Inactive Hazardous Waste Disposal Site Remedial Action
(Site No. 1-30-032)
Glen Cove, New York

January 6, 2000

Prepared for:

The City of Glen Cove
Glen Cove, New York

Prepared by:

REMEDIAL ENGINEERING, P.C.
AND
ROUX ASSOCIATES, INC.
1377 Motor Parkway
Islandia, New York 11788
in Association With
DVIRKA AND BARTILUCCI CONSULTING ENGINEERS
330 Crossways Park Drive
Woodbury, New York 11797

2.0 RADIATION MONITORING PLAN

Soil excavated during the remediation at the Captain's Cove Site will be monitored for radiation to:

- segregate soil/waste that may contain radioactive contamination (if any); and
- to protect on-site workers from potential exposure to dangerous levels of radiation.

The radiation monitoring will be performed by the Contractor's Health Physics Field Technician (HPFT) under the direction of the Consultant's Field Engineer and Health Physics Safety Officer (HPSO). Any radioactive waste identified as a result of monitoring will be segregated and managed by the Contractor as described in the Contractor's Construction Contingency Plan (CCP).

This monitoring protocol, summarized in Figure 1, entails identification of minimum qualifications for the Contractor's HPFT, selection of suitable monitoring instruments, instrument calibration, monitoring methodology, and establishing background radiation levels at the Site. Each of these considerations is described below.

2.1 Qualifications Health Physics Field Technician

The radiation monitoring will be performed by the Contractor's HPFT. The Contractor's HPFT qualifications will be reviewed by the Consultant and the NYSDEC Health Physicist. At a minimum, the candidate HPFT will have successfully completed Radiation Worker Training, have 2 to 4 years experience performing field gamma radiation monitoring, have experience with the monitoring instruments specified below (including calibration, routine operation, and performing field instrument checks), have demonstrated experience in establishing site background radiation levels, and have experience collecting, handling, and shipping samples for radiological analyses.

2.2 Selection of Radiation Monitoring Instrument

The selection of a radiation monitoring tool was based on the type of radiation in the Li Tungsten mill tailings located adjacent to the Site. The radiation contamination is primarily due to the presence of uranium and thorium contained in mill tailings generated during mineral processing of tungsten ores at the former Li Tungsten Site, located on Herb Hill Road, in Glen Cove, New York. The tailings also contain daughter products, including radium, from the radioactive decay of the parent radionuclides. Radioactivity is produced during the subsequent decay of the daughter products until a stable isotope is achieved. During decay, radioactivity in the form of particles and energy is emitted from the radionuclide. In brief, the decay processes are specific to the individual isotopes, and thus, each decay process produces a specific form of radioactivity (e.g., alpha, beta and gamma radiation). Uranium produces alpha and gamma radiation and is the primary contributing radionuclide to the radioactivity in the Li Tungsten tailings. The other radionuclides, including thorium and radium, also emit gamma and or alpha radiation. Although alpha radiation is produced by the radionuclides present in soil adjacent to the Site, it is a low energy emission and, therefore, is absorbed by most sediments including soil. The ease of absorption by any material present between the source of the radioactivity and the count-rate meter will minimize and may prevent detection of the presence of alpha radiation. Accordingly, a radiation monitoring tool capable of detecting gamma radiation (a high energy radiation) is specified. For this purpose a Ludlum™ Model 2221 count-rate meter and scaler equipped with a 100 cm^2 (2-inch by 2-inch) sodium iodide (NaI) detector is specified.

2.3 Instrument Calibration and Operation

The radiation rate meter/scaler will be calibrated by the supplier in accordance with the instrument manufacturer's specifications. A range of radioactive NBS source materials standards (or traceable to NBS standards) will be used for calibration. A range of response configurations will be used during the calibration process. The response of the meter will be checked throughout each day using the source provided with the instrument. Source checks will be recorded in the field log book. All supplier calibration records and daily response checks will be maintained on-site throughout the duration of the remediation activities. During monitoring the count-rate meter will be operated in the audio mode to aid in detecting radiation above 2-times background.

2.4 Establishing Site Background

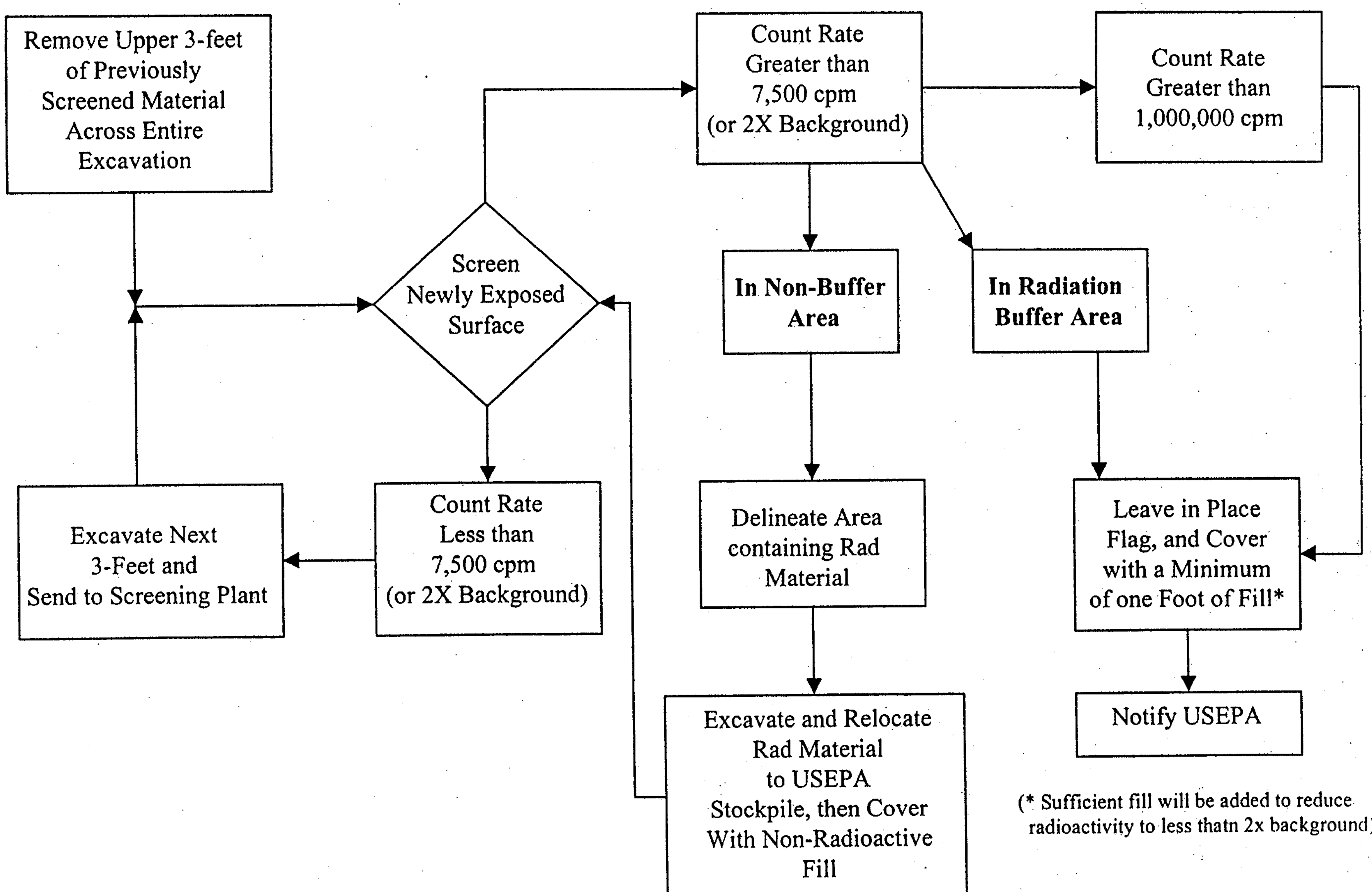
Based on the results of the Remedial Investigation/Feasibility Study (RI/FS), and the USEPA Focused Feasibility Study (FFS), the background radiation at the site ranged up to approximately 3,750 cpm. As background at the Site varies according to the media measured (e.g., different soil types etc.) at the onset of the excavation project, the Contractor's HPFT under the direction of the Consultant's HPSO will identify background radiation on soil samples collected around the Site where the absence of non-anthropogenic radioactive material has been confirmed. Measurements on the soil types will be recorded in the field log book. The background radiation values measured will be used in conjunction with previously measured values as a guide to distinguishing radiation readings due to naturally-occurring radiation from those produced by radioactive waste deposited adjacent to the Site.

2.5 Radiation Monitoring Methodology

The following radiation monitoring protocol was developed to identify radioactive material that may be encountered during remediation. The monitoring protocol described below was designed to effectively 'see' gamma radiation in approximately 10 to 15 percent, by volume, of the material excavated. In keeping with this goal, it is assumed that the meter selected for the field monitoring will 'see' gamma radiation to a depth of approximately 6-inches below the top of the surface being monitored. Based on this assumption, the monitoring will be performed on three-foot lifts of soil and will result in a monitored volume percent of approximately 17 percent. Note that the upper three feet of the area to be remediated will initially be excavated with no additional radiation monitoring. No monitoring of this upper soil horizon is warranted as the entire surface of the Site has been monitored extensively for radioactivity by the NYSDEC in 1997 and Roux Associates during the RI/FS completed during 1998. Soil horizons exposed by subsequent excavation activities will be monitored by a qualified personnel using the meter, method and scan rate specified below.

Monitoring will entail scanning the count-rate meter detector across the floor of the excavation exposed after each three foot lift of material is excavated. Approximately each foot of the excavation floor will be monitored for radiation. During monitoring the detector will be held at approximately 3-inches or less above the surface being scanned. The detector will be moved over the surface being scanned at a rate not to exceed approximately 0.5 meters per second (m/s) as per the MARSSIM (NUREG Guidance Document 1575). This scan rate will allow the collection of a reasonable number of counts per scan. If count rates exceed 2-times background, then the provisions in the Contractor's CCP will be implemented. In general, the Contractor's CCP for radiation hot spots entail recording the location of the hot spot and the maximum and

Figure 1 - Radiation Monitoring Plan Flow Chart for Radioactivity Screening of Soil During Excavation at the Captain's Cove Condominium Inactive Hazardous Waste Disposal Site, Glen Cove, New York



REMEDIAL ENGINEERING, P.C.

PPT/CG49501Y02.194/RMP-F1

Appendix C

APPENDIX C

HEALTH BASED RISK ASSESSMENT

EMILCOTT

466 Southern Blvd.
Chatham, NJ 07928-1462

Phone: 973-765-0991
Fax: 973-765-0994

HEALTH-BASED RISK ASSSSMENT
GLENN COVE FERRY TERMINAL

Prepared for:

Dvirka and Bartilucci Consulting Engineers
330 Crossways Park Drive
Woodbury, New York 11797

Prepared by:

Emilcott
466 Southern Boulevard
Chatham, NJ 07928

October 30, 2008

Report Prepared by:

H. Dale Wilson, CIH
Program Director, Industrial Hygiene & Safety

Report Reviewed by:

Paula Kaufmann, CIH
Senior Project Manager

Table of Contents

1.0 SUMMARY

Emilcott has reviewed Dvirka and Bartilucci's (D&B) *Glenn Cove Ferry Terminal Project, Supplemental Phase II Environmental Site Assessment, D&B No. 2358* which reported surface soil, sub-surface soil, groundwater, and soil gas sampling results. Based on the data reported by D&B Emilcott was contracted to conduct a health-based risk assessment for the construction phase of the Glenn Cove Ferry Terminal Project.

The risk assessment is intended to address the surrounding community and site construction workers. As such, data regarding surface soil, subsurface soil, and soil gas were evaluated as potential sources of exposure. Groundwater related exposures were excluded as excavation of the site is stated to be 4 feet or less below grade and groundwater exists at 12 to 15 feet below grade.

Finding of this risk assessment are based on health-based risk assessment calculations that are typically used to evaluate risk posed by environmental remediation projects. Our findings are summarized below:

- Airborne dust should not exceed background plus 780 micrograms per cubic meter ($\mu g/m^3$) of air at the perimeter of the site in order to be protective of the surrounding community. This is based upon arsenic soil data and arsenic toxicity.
- Airborne dust should not exceed 11 milligrams per cubic meter (mg/m^3) of air in the work zone in order to be protective of site workers. This is based upon arsenic soil data and the OSHA Permissible Exposure Limit (PEL) for arsenic.
- Any soil gas released during this project should not adversely affect the community or site workers as the maximum concentration of each soil gas contaminant is below its calculated risk-based vapor concentration and OSHA PEL.
- An effective dust control program should be implemented to control the generation of airborne dusts containing asbestos.

2.0 SOIL DUST

Excavation and construction activity will disturb soils on the site and consequently generate airborne dust. Airborne dust creates a potential for exposure to site workers and the surrounding community; therefore, dust control during excavation and site work is essential so as not to create a potentially hazardous exposure scenario. This risk assessment will focus on documenting the concentration of airborne dust which must be maintained on site so as to not adversely impact site workers and the surrounding community.

The project includes excavation of the majority of the site to a depth of 6 inches below grade, with excavation of smaller areas to depths of 2 to 4 feet below grade. D&B's surface and sub-surface soil data indicates that the following compounds were present above the New York State Department of Environmental Conservations (NYSDEC) Restricted Use Commercial Soil Cleanup Objectives at one or more boring locations:

- Benzo(a)pyrene
- Arsenic
- Barium

Asbestos was also confirmed to be present in surface and sub-surface soils.

2.1 Community Dust

Health risk associated with benzo(a)pyrene, arsenic, and barium can be attributed to non-carcinogenic and/or carcinogenic health effects. Using the following risk assessment calculations the maximum permissible airborne soil concentration can be determined based on the toxicity of each site contaminant.

The exposure scenario assumes 8-hours of site work per day, 5 days per week, for 52 weeks.

Non-carcinogens

$$\text{Airborne Soil}_{NC} = \frac{\text{Reference concentration * Averaging Time}}{\text{Soil Conc. (mg/kg) * 1 kg/1E+6 mg * Exposure Time * Exposure Frequency * Exposure Duration}}$$

Where:
Reference concentration = Contaminant-specific from http://www.epa.gov/reg3hwmd/risk/human/index.htm .
Averaging Time = 1 year
Soil Concentration = maximum soil concentration (mg/kg)
Exposure Time = Work shift length in hours/24 hours (8 hours/24 hours = 0.33)
Exposure Frequency = Length of actual excavation in days/365 days (260 days/365 days = 0.71)
Exposure Duration = 1 year

Carcinogens

$$\text{Airborne Soil}_{Car} = \frac{\text{Target Risk * Averaging Time}}{\text{Soil Conc. (mg/kg) * 1 kg/1E+6 mg * URF * Exposure Time * Exposure Frequency * Exposure Duration}}$$

Where:
Target Risk = 1×10^{-6}
Averaging Time = 70 years
Soil Concentration = Maximum soil concentration (mg/kg)
Unit Risk Factor (URF) = Contaminant-specific in terms of $(\mu g/m3)^{-1}$ from http://www.epa.gov/reg3hwmd/risk/human/index.htm
Exposure Time = Work shift length in hours/24 hours (8 hours/24 hours = 0.33)
Exposure Frequency = Length of actual excavation in days/365 days (260 days/365 days = 0.71)
Exposure Duration = 1 year

Using these formulas, the maximum airborne soil concentration based on non-carcinogenic and carcinogenic effects were calculated and are summarized in Table 1.

Table 1 – Maximum Airborne Soil Concentration

Compound	Airborne Soil$_{NC}$ (µg/m^3)	Airborne Soil$_{Car}$ (µg/m^3)
Arsenic	1,400	780
Barium	3,100	No basis
Benzo(a)Pyrene	No basis	220,000

Based on Table 1, the carcinogenic effects of arsenic are clearly the controlling parameter in establishing a maximum airborne soil concentration that will be protective of the surrounding community. Therefore, the Community Air Monitoring Program (CAMP) should establish a downwind Particulate Action Level of upwind background concentration plus 780 µg/m^3 (upwind + 780 µg/m^3), as an 8-hour average, in order to minimize potential impacts to the surrounding community.

2.2 Site Worker Dust

Exposures to site workers should be maintained so that the airborne concentrations of site contaminants do not exceed the respective Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL). While it is not possible to directly measure the airborne concentration of individual site contaminants using direct-reading instrumentation, it is possible to directly measure the concentration of airborne dusts in the active work zone in real time. Consequently, a Work Zone Dust Action Level based on OSHA PELs can be calculated using the following formula:

Work Zone Dust Action Level = [OSHA PEL(mg/m^3)] * [1 kg/1E+6 mg] / [maximum soil concentration (mg/kg)] / [safety factor (10)]

Table 2 -Work Zone Dust Action Level

Contaminant	OSHA PEL-TWA	Maximum Soil Concentration (mg/kg)	Airborne Soil Concentration Equivalent to PEL (mg/m^3)
Benzo(a)pyrene	0.2 mg/m^3	1.2	17,000
Arsenic	0.01 mg/m^3	87.7	11
Barium	0.5 mg/m^3	680	74

Based on Table 2, maintaining an airborne particulate concentration in the work zone at a concentration less than 11 mg/m^3 will adequately control occupational exposures.

2.3 Asbestos

It is not possible to directly calculate a particulate action levels based upon asbestos. Instead control of potential asbestos exposures to the community or site workers must focus on implementation of strict dust control measures when excavating or otherwise handling soils when asbestos is known to be present. Such dust control measures should include:

- Wet methods – maintaining soil in a wet/damp condition using water sprays or mist.
- Covering stockpiled soils with tarps when soil is not being actively handled.

As part of the CAMP, the airborne asbestos concentration should be monitored on a daily basis at the downwind perimeter of the site when excavating or otherwise handling soils where asbestos is known to be present. The CAMP should establish an Asbestos Action Level of 0.01 fibers per cubic centimeter of air (0.01 fibers/cc). This is the US EPA Clearance Level for asbestos abatement projects.

Occupational exposures to asbestos should be maintained below the OSHA PEL of 0.1 fibers/cc.

3.0 SOIL GAS

Soil gas samples were collected at 3 to 4 feet below grade. Excavation is expected to reach a maximum of 4 feet. Consequently, excavation has the potential to release soil gas into the air. D&B's report identified the following site contaminants being present in soil gas:

- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- 4-Ethyltoluene
- Acetone
- Benzene
- Carbon Disulfide
- cis-1,2-Dichloroethene
- Ethyl Acetate
- Ethyl Benzene
- Methyl tert-Butyl Ether (MTBE)
- m & p-Xylene
- o-Xylene
- Styrene
- Toluene

Health risk associated with the compounds can be attributed to non-carcinogenic and/or carcinogenic health effects. Using the following risk assessment calculations the maximum permissible airborne concentration of each contaminant can be determined based on the toxicity of each site contaminant.

The exposure scenario assumes 8-hours of site work per day, 5 days per week, for 52 weeks.

Non-carcinogens

$$\text{Airborne Vapor}_{NC} = \frac{\text{Reference concentration} * \text{Averaging Time}}{\text{Exposure Time} * \text{Exposure Frequency} * \text{Exposure Duration}}$$

Where:
Reference concentration = Contaminant-specific from http://www.epa.gov/reg3hwmd/risk/human/index.htm .
Averaging Time = 1 year
Exposure Time = Work shift length in hours/24 hours (8 hours/24 hours = 0.33)
Exposure Frequency = Length of actual excavation in days/365 days (260 days/365 days = 0.71)
Exposure Duration = 1 year

Carcinogens

$$\text{Airborne Vapor}_{Car} = \frac{\text{Target Risk} * \text{Averaging Time}}{\text{URF} * \text{Exposure Time} * \text{Exposure Frequency} * \text{Exposure Duration}}$$

Where:
Target Risk = 1×10^{-6}
Averaging Time = 70 years
Unit Risk Factor (URF) = Contaminant-specific in terms of $(\mu g/m3)^{-1}$ from
http://www.epa.gov/reg3hwmd/risk/human/index.htm
Exposure Time = Work shift length in hours/24 hours (8 hours/24 hours = 0.33)
Exposure Frequency = Length of actual excavation in days/365 days (260 days/365 days = 0.71)
Exposure Duration = 1 year

Using these formulas, the maximum risk-based vapor concentrations for non-carcinogenic and carcinogenic effects were calculated, and are summarized in Table 3.

Table 3 – Comparison of Maximum Soil Gas Concentration vs. Risk-Based Vapor Concentrations

	Maximum Reported Soil Gas Concentration ($\mu g/m^3$)	$Vapor_{NC}$ ($\mu g/m^3$)	$Vapor_{Car}$ ($\mu g/m^3$)
1,2,4-Trimethylbenzene	15.5	29	No basis
1,3,5-Trimethylbenzene	8.39	25	No basis
4-Ethyltoluene	9.79	No basis	No basis
Acetone	2,820	13,000	3,900
Benzene	31.8	130	3,800
Carbon Disulfide	7.6	2,900	No basis
cis-1,2-Dichloroethene	6	No basis	No basis
Ethyl Acetate	21.6	No basis	No basis
Ethyl Benzene	15.9	4,200	12,000
MTBE	240	12,000	110,000
m&p-Xylene	53	2,900	No basis
o-Xylene	15	2,900	No basis
Styrene	2.6	4,200	No basis
Toluene	99.6	21,000	No basis

Based on these calculations any soil gas released during this project should not adversely affect the community, as the maximum soil gas concentration for each contaminant is below its calculated risk-based vapor concentration.

Any soil gas released during the project also should not adversely affect site workers, as the maximum soil gas concentration is well below the OSHA PEL for each contaminant.

Terms & Conditions:

1. Emilcott's services are undertaken for the sole benefit of the client. Any reports associated with our services may not be used by any other person or entity without the express written consent of Emilcott Associates, Inc. and the client. Any use which a third party makes of such reports, or any reliance on decisions made based on them, is the responsibility of such third parties. Emilcott accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the reports.

2. Some of the information presented in the reports will result from existing documents or through interviews. While attempts will be made to obtain confirmatory sources of information, Emilcott may be required to assume the information provided is accurate.

3. The conclusions presented by Emilcott represent our best technical judgment based on the data obtained. The conclusions are based on site conditions encountered at the time the work was performed, at specific locations, and cannot be extrapolated to other areas. Due to the nature of the investigation and the limited data available, Emilcott cannot warrant against undiscovered environmental liabilities.

4. If any conditions become apparent that differ significantly from our understanding of conditions as presented, we request that we be notified immediately to reassess the conditions provided.

APPENDIX C

RADIATION MONITORING PLAN

GLEN ISLE WATERFRONT REDEVELOPMENT
GLEN COVE, NEW YORK

RADIATION MONITORING PLAN

PREPARED FOR:

RXR-Glen Isle Partners, LLC
625 RXR Plaza
Uniondale, NY 11556

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

James P. Rhodes, CPG, Senior Vice President jimr@pwgrosser.com
Derek Ersbak, Project Manager dereke@pwgrosser.com

PWGC Project Number: RGI 1304

DECEMBER 2013

TABLE OF CONTENTS

Page

LIST OF ACRONYMS

cpm	Counts per Minute
EPA	United States Environmental Protection Agency
FS	Feasibility Study
HPFT	Health Physics Field Technician
HPSO	Health Physics Safety Officer
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentrations
m/s	Meters per Second
NaI	Sodium Iodide
NYSDEC	New York State Department of Environmental Conservation
pCi/g	Picocuries per Gram
RMP	Radiation Monitoring Plan
RI	Remedial Investigation
SMP	Site Management Plan

PWGC
Strategic Environmental Engineering Solutions

PROJECT: Glen Isle Waterfront Redevelopment Project. The project will include an investigation to document current subsurface condition at the Glen Isle Waterfront Redevelopment site for the purposes of characterizing the site for subsequent insurance coverage and as a condition of closing on the property.

This form indicates the review and acceptance of the document listed below by a Certified Health Physicist.

THE FOLLOWING DOCUMENT(S) HAVE BEEN REVIEWED AND ACCEPTED:

- Radiation Monitoring Plan – Glen Isle Waterfront Redevelopment

PREPARED FOR:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

PREPARED ON BEHALF OF
RXR-Glen Isle Partners, LLC
625 RXR Plaza
Uniondale, New York 11556

PREPARED BY:
P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716

REVIEWED & ACCEPTED BY:
Dennis M. Quinn, CHP
3 Shadow Lane
Hopewell Junction, New York 12533

Dennis M. Quinn 12/13/2013

Dennis M. Quinn, CHP Date

1.0 INTRODUCTION

This Radiation Monitoring Plan (RMP) has been prepared in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual, Revision 1* (EPA, August 2000 and June 2001 updates) (MARSSIM), and with the Site Management Plans (SMP) for the Glen Cove Ferry Terminal and Li Tungsten Sites in Glen Cove, NY: *Site Management Plan, Captain's Cove Site* (Dvirka and Bartilucci, June 2010) and *Site Management Plan for Li Tungsten Site, Glen Cove, NY* (Dvirka and Bartilucci, May 2012). These SMPs provide additional background information, site descriptions, redevelopment plans and soil management specifications for each of the Sites.

This RMP will be implemented during a Pre-Construction Confirmatory Data Gap Subsurface Investigation at the Glen Isle Waterfront Redevelopment Site by the Contractor's Health Physics Field Technician (HPFT) in coordination with the Consultant's Field Engineer. All parties entering the site, including representatives of the United States Environmental Protection Agency (EPA), New York State Department of Environmental Conservation (NYSDEC) and or the City of Glen Cove, are required to comply with this RMP. The RMP may be revised based upon radiation levels measured in the field after earthwork or excavation activities have been initiated. Any proposed changes must be reviewed and approved by the Consultant Health Physics Safety Officer (HPSO) (or their designee) and the NYSDEC.

The NYSDEC will be notified at a minimum of 15 days prior to earthwork or excavation activities.

1.1 Purpose and Scope

In accordance with past remedial efforts summarized in the SMPs, radioactive soils were previously removed from areas on and/or adjacent to the Captain's Cove and Li Tungsten Sites and the excavations were backfilled with clean soil. The purpose of this RMP is to address radiation monitoring activities to be performed during the -Construction Confirmatory Data Gap Subsurface Investigation which include test pits, geotechnical borings, and subsurface soil and groundwater sampling. Specifically, soil disturbed during investigative activities will be monitored for radiation to:

- Segregate soil/waste that may contain radioactive contamination; and
- Protect onsite workers from potential exposure to dangerous levels of radiation.

2.0 RADIATION MONITORING PLAN

The monitoring protocol specified in subsequent sections includes the identification of minimum qualifications for the Contractor's HPFT, selection of appropriate radiation monitoring instruments, instrument calibration, radiation monitoring methodology and establishing background radiation levels at both the Captain's Cove and Li Tungsten Sites. Any radioactive waste identified as a result of monitoring will be segregated and managed by the Contractor as described in the SMPs.

2.1 Health Physics Field Technician Qualifications

Radiation monitoring will be performed by the Contractor's HPFT. The Contractor's HPFT qualifications will be reviewed by the Consultant. At a minimum, the candidate HPFT will have successfully completed Radiation Worker Training, have 2 years of experience performing field gamma radiation monitoring, have experience with the monitoring instruments specified in Section 2.2 (including routine operation and performing instrument field checks), have demonstrated experience in measuring site background radiation levels and have experience with the collection, handling and shipment of samples for radiological analyses.

2.2 Selection of Radiation Monitoring Instrument

The selection of radiation monitoring equipment was based on the type of radiation in the Li Tungsten mill tailings previously located on and/or adjacent to the Sites. The mill tailings, which contained uranium and thorium, were generated during mineral processing of tungsten ores at the Li Tungsten Site. The tailings also contained daughter products, including isotopes of thorium, uranium, radium, and several other products of the natural decay chains. These radioactive elements produce a mixture of alpha, beta, and gamma radiation. Although alpha and beta radiations are produced by the radionuclides in soil that was present on and/or adjacent to the Sites, these radiations have low penetrating ability, and they are shielded by the first centimeter of soil. This low penetrating ability for alpha and beta cause these radiations to be very difficult to detect by direct measurement. Accordingly, radiation monitoring equipment capable of detecting gamma radiation (a highly penetrating radiation) is specified. For this purpose, a Ludlum™ Model 2221 count-rate meter and scaler (or equivalent) equipped with a 100 cm^3 (2" x 2") sodium iodide (NaI) detector for walkover surveys and a Ludlum™ Model 3 or 12 count-rate meter and scaler (or equivalent) equipped with a 44-9 frisker probe for screening of core samples are specified.

2.3 Radiation Instrument Calibration and Operation

The radiation rate meter/scaler will be calibrated by the supplier in accordance with the instrument manufacturer's specifications. A source traceable to the National Institute for Standards and Technology (NIST) will be used for calibration. This calibration, in combination with manufacturer developed energy response curves, will be used to characterize instrument response. The response of the meter will be evaluated with a check source daily before and after each survey. Source check results will be recorded in the field log book. All supplier calibration records and source check results will be maintained onsite throughout the duration of redevelopment activities. During monitoring, the count-rate meter will be operated in the audio mode to aid in detecting radiation count rate changes above 2-times background. The serial numbers and calibration dates will be recorded in the results report.

2.4 Establishing Site Background

PWGC has established a background radiation level in counts per minute (cpm) in accordance with PWGC's Radiation Monitoring Plan for Captain's Cove and Li Tungsten dated March 2013.

On May 8, 2013, PWGC mobilized to the site to perform test pits in the area of the bulkhead on the Captain's Cove site to inspect current condition of the bulkhead tiebacks. Prior to performing work onsite, a gamma survey for background determination was performed at the wildlife preserve that borders the property in the up-gradient direction. The preserve was found to have similar geologic properties and soil types similar to Li Tungsten and Captain's Cove sites.

A Ludlum™ Model 2221 count-rate meter and scaler equipped with a 100 cm^3 (2" x 2") sodium iodide (NaI) detector was utilized. The meter was standardized utilizing the accompanying cesium-137 check source (5μCi). In order to establish background, 20 readings (one minute static counts) were collected from the Gravies' Point

Preserve, Trail 5 over an approximate area of one acre. Based upon the readings, a range of 6,390 to 7,915 counts per minute and a mean of 7,324 cpm has been established as background. Two times background, 14,648 counts per minute, will be utilized as a decision factor for soil screening purposes during the investigation.

Prior to commencing work, a background check will be performed. The background check will include performing one minute static counts at three locations in the Garvies' Point Preserve. The background check should be within 10% of the previous determined value. If it is greater than 10%, the full site background determination will be performed.

In addition to the overall site background, a one minute static count will be taken prior to the start of work at each excavation location. This reading will be recorded.

2.5 Radiological Walkover Survey/Scan

Prior to the installation of soil borings and test pits on the Li Tungsten and Captain's Cove Sites a radiological walkover survey/scan will be completed. The survey will consist of screening of a discrete area centered around the proposed soil boring or test pit and will measure 10 feet by ten feet for soil borings and twenty feet by twenty feet for test pits. The protocol is detailed below.

At each survey location a 100% scan will be performed using a Ludlum™ Model 2221 count-rate meter and scaler (or equivalent) equipped with a 100 cm^3 (2" x 2") sodium iodide (NaI) detector. 100% scan is defined as walking at 0.5 meters/second and moving the probe in a serpentine motion. The technician will follow one meter-wide lanes over each entire survey area. In addition, a check of areas with elevated count rates with a collimated 2" x 2" NaI detector may be necessary to locate the source of the high readings, if any. The walkover survey for each survey area will be recorded on a radiological survey form.

2.5 Radiation Monitoring Methodology

The following radiation monitoring protocol was developed to identify radioactive material that may be encountered during the investigation.

2.5.1 Personal Protective Equipment

Personal protective equipment will include the use of Level D personal protective equipment (PPE) consisting of steel toe boots, hard hats, work clothes, and nitrile gloves. Tyveks will be used if soil is discovered above two times background.

2.5.2 Test Pit Excavation Screening

At each location a backhoe or equivalent will be utilized to perform the test pit. Prior to the excavation, 10-mil polyethylene sheeting, sufficiently large to hold the anticipated excavated soil will be laid on the ground in the area where the excavated soil will be placed. Each test pit will be performed in two foot lifts and placed on the polyethylene sheeting in individual piles.

The monitoring protocol described below was designed to effectively detect gamma radiation to a depth of approximately 6 inches below the top of the surface being monitored. Based on this assumption, the monitoring will be performed on two-foot lifts of soil and will result in a monitored volume percent of approximately 25 percent. Screening will be performed using a Ludlum™ Model 2221 count-rate meter and scaler (or equivalent) equipped with a 100 cm^3 (2" x 2") sodium iodide (NaI) detector.

Radiation monitoring will entail scanning with the NaI detector and the count-rate meter detector across the floor of the excavation after each two-foot lift of material is excavated. If survey at the floor of the excavation is not practical (e.g., narrow trench or core samples), then the soil can be surveyed after removal. If removed soil is surveyed, it must be spread to a depth of 2 feet or less. During monitoring, the detector will be held approximately 3 inches or less above the surface being scanned. The detector will be moved over the surface being scanned at a rate not to exceed approximately 0.5 meters per second (m/s). This scan rate will allow the collection of a reasonable number of counts per scan. If a detection greater than two times background is observed, the two-foot lift will be spread into six inch deep layers and rescanned. A general description of the material that was scanned (e.g., sand clay, peat, waste, etc.) will also be recorded.

2.5.3 Soil Core Screening

Prior to performing soil borings, 10-mil polyethylene sheeting, sufficiently large to hold the anticipated number of soil cores will be laid on the ground in the area where the soil borings will be performed.

The monitoring protocol described below was designed to effectively detect gamma radiation within soil cores. Screening will be performed using a Ludlum™ Model 3 or 12 count-rate meter and scaler (or equivalent) equipped with a 44-9 frisker probe.

Radiation monitoring will entail scanning with the 44-9 probe and the count rate meter detector across the top of each sediment core in two foot long intervals. During monitoring, the detector will be held approximately 1 inch or less above the surface being scanned. The detector will be moved over the surface being scanned at a rate not to exceed approximately 5 centimeters per second (cm/s). This scan rate will allow the collection of a reasonable number of counts per scan. The readings will be included on the soil boring logs.

2.5.4 Screening Criteria

For the soil surface or excavation screening using the NaI detector, if count rates exceed 2-times background (as developed in 2.4.1, above), then the provisions specified in the SMPs will be implemented. In general, the SMPs require that excavated material that exceeds radiological screening criteria shall be stockpiled separately and the NYSDEC shall be notified. In addition, the excavated material shall be sampled and analyzed in accordance with Section 2.6 below. The location, including global positioning system (GPS) coordinates, of the hot spot and the maximum and minimum count rates observed (rounded to the nearest 100 cpm) will be recorded in the bound field notebook. Hot spot locations will be marked with paint, flags, or other marker.

Radiation levels measured up to two times the Site background is not considered to be a hazard. Radiation measurements in excess of approximately 2-times background will result in controlled disposition of the soil; however, it is not expected to be at a level that will be hazardous to the onsite workers. Note that past surveys of excavations onsite have not detected levels above two times background. As a protective measure against radiation dose to onsite workers, radioactivity above 1 mrem/hr (cpm equivalent to be calculated after instrument calibration) will be considered a potential radiation worker dose risk. Soil that exhibits readings above background but below the threshold for radiation worker dose risk will be handled as described in the SMPs, as there is no significant exposure risk at these levels.

2.6 Soil Sampling and Radiological Analysis

For any soil that is identified as exceeding the criteria of two times the Site background, a minimum of one sample of at least 400 grams shall be taken per stockpile, where the individual stockpile does not exceed 500 cubic yards. Samples shall be analyzed by gamma spectroscopy using Method EML-HASL-300 or equivalent. The spectroscopy should be specified to identify gamma emitting radionuclides associated with the uranium and thorium decay chains. The count times, sample sizes, and geometry should be able to produce Minimum Detectable Concentrations (MDC) of 0.1 picocuries per gram (pCi/g) for Ac-228, Pb-212, Bi-212, Tl-208, Ra-226/U-235, Pb-214, and Bi-214. For U-235, the MDC should be 1 pCi/g or better, and for Pa-234m, the MDC should be 10 pCi/g. Samples to be analyzed for radionuclides shall be dried samples and will be analyzed before activities of the Ra-226 and its daughter products have returned to equilibrium. If there are indications of readings in excavations that exceed the criteria of two times background, then confirmation sampling and analysis will be performed in accordance with NYSDEC guidance in DER-10 (May 2010).

Confirmation samples shall be collected in excavations to document any contamination that remains in place in accordance with the SMPs. Confirmation samples shall be analyzed by gamma spectroscopy using Method EML-HASL-300, or equivalent, to identify gamma emitting radionuclides associated with uranium and thorium decay chains.

3.0 REFERENCES

Dvirka and Bartilucci, 2010. *Site Management Plan, Captains Cove Site*, June 2010.

Dvirka and Bartilucci, 2012. *Site Management Plan for Li Tungsten Site, Glen Cove, NY*, May 2012.

EPA, 2000 and 2001. *Multi-Agency Radiation Survey and Site Investigation Manual, Revision 1*, August 2000 and June 2001 updates.

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

7.0 QUALITY ASSURANCE

Environmental sample analysis conducted at the Site, either as part of the redevelopment work or post-redevelopment, will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), latest revision. All data will be reported in accordance with the NYSDEC Division of Environmental Remediation EQuIS data reporting requirements. Prior to commencement of the redevelopment of the Site, the Owner's Contractor shall be required to prepare a site-specific Quality Assurance/Quality Control (QA/QC) Plan pertaining to sampling and analysis of media that will be either removed from the Site or brought there to be used on-site during Site redevelopment. This section will provide the basis for the sampling and analysis required to be performed during the Site redevelopment by the Owner's Contractor, as well as the sampling and analysis required for continued long-term operations, maintenance and monitoring for the Site to be performed by the Owner.

7.1 Data Quality Requirements and Assessments

Data quality requirements and assessments are provided in the NYSDEC ASP, which includes the detection limit for each analyte and sample matrix. Note that the quantification limits, estimated accuracy, accuracy protocol, estimated precision and precision protocol are determined by the laboratory and will be in conformance with the requirements of the NYSDEC ASP (latest revision) and/or USEPA SOW for organics and inorganics (latest revision), where applicable.

In addition to meeting the requirements provided in the NYSDEC ASP, the data must also be useful in evaluating the quality of media sampled. Data obtained during the sampling will be compared to SCGs. The SCGs to be used include:

Matrix	SCG
Soil	NYSDEC Part 375 Restricted Residential-Use Soil Cleanup Objectives

The methods of analysis will be in accordance with the NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this SMP, but will be available upon request from the laboratory selected to perform the analysis. The laboratory will be New York Department of Health (NYSDOH) Environmental Laboratory Approved Program (ELAP) certified for organic and inorganic analyses.

7.1.1 Data Representativeness

Samples may be collected from various media, either during Site redevelopment or during long-term operations, maintenance and monitoring being performed at the Site. Collection of representative data is necessary to ensure the data obtained is usable. Examples of methods for collection of representative samples are as follows:

- Soil – Samples will be obtained from the excavation floors, excavation sidewalls, stockpiles, etc. Samples will be collected using a dedicated polyethylene scoop.
- Equipment Calibration – Field equipment will be calibrated daily before use according to the manufacturer's procedures.
- Equipment Decontamination – Non sterile sampling equipment will be decontaminated prior to use at each location according to the NYSDEC approved procedures described in Section 7.3.

The site-specific QA/QC Plan prepared by the Owner's Contractor prior to redevelopment will include a more detailed description of data representativeness.

7.1.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP certified laboratory and the NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

7.1.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for the project. The acceptability of less than 100% complete data, meeting all QA/QC protocols/standards, will be evaluated on a case-by-case basis.

7.2 Detailed Sampling Procedures

Environmental samples may be collected from different locations as part of the redevelopment of the Site and continued long-term operations, maintenance and monitoring. It is anticipated that soil samples may be collected and may consist of samples collected from soil stockpiles, excavation floors and sidewalls. Sampling procedures and equipment are described in this section.

Disposable sampling equipment will be utilized for this project to the extent practicable. There will be several steps taken after the transfer of the sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sampling material. The container will not be submerged in water in an effort to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

The sample container will then be properly labeled. Information such as sample number, location, collection time and sample description will be recorded in the field logbook. Associated forms (e.g., Chain of Custody forms) will then be completed and will stay with the sample. The samples will be packaged in a manner that will allow the appropriate storage temperature (4°C) to be maintained during shipment to the laboratory.

7.2.1 Sample Identification

Each sample container will have a label of durable material affixed to it, which specifies the following sample information:

- Sample location;
- Sample type;
- Sample identification number (including well designation);
- Name(s) of sampler(s);
- Date and time of sample collection;
- Container number for that sample, if more than one container is used (e.g., #1 of 4); and
- Laboratory analyte.

All samples collected during the work will be labeled with a sample identification code. The code will identify the sample type, sample location and QA/QC requirements

7.2.2 Sample Preservation, Handling and Shipment

All analytical samples will be placed in the appropriate sample containers as specified in the NYSDEC ASP. The holding time criteria identified for the individual methods of the ASP will be followed.

Prior to packaging any sample for shipment, the sample containers will be checked for proper identification and compared to the field logbook for accuracy. The samples will then be wrapped with a cushioning material. Sample containers will be placed in a cooler with ice immediately after sample collection and maintained at 4°C throughout the duration of the sampling event and subsequent shipment to and storage at the analytical laboratory until analysis.

All necessary documentation required to accompany the sample during shipment will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with packaging tape and custody seals will be placed in such a manner that any opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped for laboratory receipt within 48 hours of sample collection in accordance with NYSDEC requirements. The laboratory will be notified prior to the shipment of the samples.

7.2.3 Soil

1. Be certain that the sample location is noted in the field log book.
2. If a dedicated sampling device is not used, be certain that the sampling equipment has been decontaminated utilizing the procedures outlined in Section 7.3.
3. Remove laboratory pre-cleaned sample container from sample cooler, label container with an indelible marker, and fill out Sample Information Record and Chain of Custody Form.
4. At the sample location, clear surface debris (e.g., vegetation, rocks, twigs, etc.). Collect an adequate amount of soil using a decontaminated or disposable scoop and/or sterile wooden tongue depressor. Transfer the sample directly into the sample container.
5. Return the sample container to the cooler.
6. If reusable, decontaminate the sampling equipment according to the procedures described in Section 7.3.

7.3 Decontamination Procedures

All field sampling equipment should be sterile and dedicated to a particular sampling point. In instances where this is not possible, a field cleaning (decontamination) procedure will be used in order to reduce the chances of cross-contamination between sample locations. A decontamination station will be established for all field activities.

7.3.1 Field Decontamination Procedures

All non-disposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling location and prior to leaving the Site). Different decontamination procedures are used for various types of equipment that perform the field activities as discussed below. When using field decontamination, it is advisable to start sampling in the area of the Site with the lowest contaminant probability and proceed through to the areas of highest suspected contamination.

7.3.2 Decontamination Procedures for Sampling Equipment

Teflon, PVC, polyethylene, polystyrene and stainless steel sampling equipment decontamination procedures will be the following:

- Wash thoroughly with non-residual nonionic anionic detergent (such as Alconox) and clean potable tap water using a brush to remove particulate matter or surface film.
- Rinse thoroughly with tap water.
- Rinse thoroughly with distilled water.
- Rinse in a well ventilated area with methanol (pesticide grade) and air dry.
- Rinse thoroughly with distilled water and air dry.
- Wrap completely in clean aluminum foil with dull side against the equipment. For small sampling items, such as scoops, decontamination will take place over a drum specifically used for this purpose.

The first step, a soap and water wash, is to remove all visible particulate matter and residual oils and grease. This is followed by a tap water rinse and a distilled/deionized water rinse to remove the detergent. Next, a high purity solvent rinse is designated for trace organics removal. Methanol has been chosen because it is not an analyte of concern in the Target Compound List (TCL). The solvent must be allowed to evaporate and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent. The aluminum wrap protects the equipment and keeps it clean until it is used at another sampling location.

7.4 Laboratory Sample Custody Procedures

A NYSDOH ELAP laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment will be used. The laboratory's standard operating procedures will be available upon request.

7.5 Field Management Documentation

Proper management and documentation of field activities is essential for necessary work to be conducted in an efficient and high quality manner. Field management procedures include following proper Chain of Custody procedures to track a sample from collection through analysis, noting when and how samples are to be composited (if required), preparing a Location Sketch, completing Sample Information Record Forms, Chain of Custody Forms, maintaining a daily Field Log Book, preparing Daily Field Activity Reports, completing Field Change Forms and filling out a Daily Air Monitoring Form. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were gathered and handled properly.

7.5.1 Location Sketch

Each sampling point shall have its own location sketch with permanent references, to the maximum extent practicable.

7.5.2 Sample Information Record

At each sampling location, the Sample Information Record Form is filled out and maintained including, but not limited to, the following information:

- Site name
- Sample crew

- Sample location
- Field sample identification number
- Date
- Time of sample collection
- Weather conditions
- Temperature
- Sample matrix
- Method of sample collection and any factor that may affect its quality adversely
- Field test results
- Constituents sampled
- Remarks (Sample Compositing Information)

7.5.3 Chain of Custody

The Chain of Custody (COC) is initiated at the laboratory with bottle preparation and shipment to the Site. The COC remains with the sample at all times and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and appropriate handling of the bottles and samples. When the form is complete, it should indicate that there were no lapses in sample accountability.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession, or
- It is in the individual's view after being in his or her physical possession, or
- It is secured by the individual so that no one can tamper with it, or
- The individual puts it in a designated and identified secure area.

In general, Chain of Custody Forms are provided by the laboratory contracted to perform the analytical services. At a minimum, the following information shall be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Date
- Time
- Sample location
- Sample type
- Analysis requested
- Number of containers and volume taken
- Remarks
- Type of waste
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

Chain of Custody Forms provided by the laboratory will be utilized.

The Chain of Custody Form is filled out and signed by the person performing the sampling. The original of the form travels with the sample and is signed and dated each time the sample is relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler keeps one copy and a copy is retained for the project file. The sample container must also be labeled with an indelible marker with a minimum of the following information:

- Project name/site

- Sample number
- Analysis to be performed
- Date of collection
- Compositing information

A copy of the completed form is returned by the laboratory with the analytical results.

7.5.4 Split Samples

Whenever samples are being split with another party, a Receipt for Samples Form must be completed and signed. A copy of the COC Form will accompany this form.

7.5.5 Field Log Book

Field log books must be bound and should have consecutively numbered water resistant pages. All pertinent information regarding the Site and sampling procedures must be documented. Notations should be made in log book fashion, noting the time and date of all entries. Information recorded in this notebook should include, but not be limited to, the following:

The first page of the log contains the following information:

- Project name and address
- Name, address and phone number of field contact
- Owner and address, if different from above
- Suspected contamination, including concentrations

Daily entries are made for the following information:

- Purpose of sampling

- Location of sampling point
- Number(s) and volume(s) of sample(s) taken
- Description of sampling point and sampling methodology
- Date and time of collection, arrival and departure
- Collector's sample identification number(s)
- Sample distribution and method of storage and transportation
- References, such as sketches of the sampling Site or photographs of sample collection
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance), water levels, drilling logs, and organic vapor and dust readings
- Signature of personnel responsible for completing log entries.

7.5.6 Daily Field Activity Report

At the end of each day of field work, the Field Operations Manager, or designee, completes this form noting personnel on-site and summarizing the work performed that day, equipment, materials and supplies used, results of field analyses, problems and resolutions. This form is then signed and is subject to review.

7.5.7 Field Changes and Corrective Actions

Whenever there is a required or recommended investigation/sampling change or correction, a Field Change Form must be completed.

7.6 Calibration Procedures and Preventative Maintenance

The following information regarding equipment will be maintained for the project:

1. Equipment calibration and operating procedures that will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system.

Calibration of field equipment will be done daily at the sampling Site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.

2. Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventive maintenance, in accordance with the NYSDEC ASP, for laboratory equipment is contained in the laboratory's standard operating procedures and is available upon request.

7.7 Performance of Field Audits

During field activities, the QA/QC officer may accompany sampling personnel into the field to verify that the Site sampling program is being properly implemented and to detect and define problems so that corrective action can be taken. All findings will be documented and provided to the Field Operations Manager.

7.8 Control and Disposal of Contaminated Material

In general, soiled personal protective equipment (PPE) and disposable sampling equipment (i.e., bailers, tongue depressors, scoops) will be considered solid waste and contained and disposed off-site. If hazardous waste contamination of PPE or disposable equipment is suspected, due to elevated measurements of screening instruments, visual observations, odors or other means, PPE and equipment will be drummed and secured on-site until a hazardous waste determination can be made. Once a determination has been made, an approved disposal method will be employed.

7.9 Documentation, Data Reduction and Reporting

A NYSDOH ELAP laboratory meeting requirements for documentation, data reduction and reporting will be used. All data will be cataloged according to sampling locations and sample identification nomenclature.

NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for VOA Analysis, B/N-A Analysis, Pesticides/PCB Analysis and Inorganic Analysis) will be completed and included with each data package. The sample tracking forms are required and supplied by the NYSDEC ASP.

7.10 Data Validation

Data validation will be performed in order to define and document analytical data quality in accordance with NYSDEC requirements that investigation data must be of known and acceptable quality. The analytical and validation processes will be conducted in conformance with the NYSDEC ASP (latest revision) and/or USEPA SOWs (latest revision).

Because the NYSDEC ASP is based on the USEPA CLP, the USEPA Functional Guidelines for Evaluating Organics Analyses for the Contract Laboratory Program (CLP) will assist in formulating standard operating procedures (SOPs) for the data validation process. The data validation process aims to make sure that all analytical requirements specific to the QA/QC plan are followed. Procedures will address validation of Routine Analytical Services (RAS) results based on the NYSDEC ASP Target Compound List and Target Analyte List for standard sample matrices.

The data validation process will provide an informed assessment of the laboratory's performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results. The overall level of effort and specific data validation procedure to be used will be equivalent to a "100% validation" of all data in any given data package.

"Qualified" analytical results for any one field sample will be established and presented based on the results of specific QC samples and procedures associated with its sample analysis group or batch. Precision Accuracy criteria (i.e., QC acceptance limits) will be used in determining the need for qualifying data. Where test data have been reduced by the laboratory, the method of reduction will be discussed in the report. Reduction of laboratory measurements and laboratory reporting of analytical parameters will be verified in accordance with the procedures specified in the NYSDEC and USEPA program documents for each analytical method (i.e., recreate laboratory calculations and data reporting in accordance with the method specific procedure).

The standard operating guideline manuals for any specific analytical methodology required will specify documentation needs and technical criteria and will be taken into consideration in the validation process. Copies of the complete data package and the data validation report, including laboratory result data report sheets, with any qualifiers deemed appropriate by the data reviewer, and supplementary field QC sample result summary statement, will be provided.

The following is a description of the two-phased approach to data validation which will be used for this investigation. The first phase is called checklisting and the second phase is the analytical quality review, with the former being a subset of the latter.

- Checklisting – The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.
- Analytical Data Review – The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Data Usability Summary Report (DUSR) will be prepared.

7.11 Performance and System Audits

A NYSDOH ELAP laboratory which has satisfactorily completed performance audits and performance evaluation samples shall be used.

7.12 Corrective Action

A NYSDOH ELAP laboratory shall meet the requirements for corrective action protocols, including sample “cleanup” to attempt to eliminate/mitigate “matrix interference.”

The NYSDEC ASP protocols include both mandatory and optional sample cleanup and extraction methods. GPC cleanup is required for soil samples by the NYSDEC ASP for semivolatile and pesticide/PCB analyses in order to meet contract required detection limits. Florisil column cleanup is required for the pesticide/PCB fraction of both soil and water samples. There are several optional cleanup and extraction methods noted in the NYSDEC ASP protocol. These include: Silica gel column cleanup, acid-base partition, steam distillation and sulfuric acid cleanup for PCB analysis.

It should be noted, that if these optional cleanup and extraction methods are requested by NYSDEC, holding time requirements should not be exceeded due to negligence of the laboratory.

7.13 Trip Blanks (Travel Blanks)

The primary purpose of this type of blank is to detect additional sources of contamination that might potentially influence contaminant values reported in actual samples both quantitatively and qualitatively. The following have been identified as potential sources of contamination:

- Laboratory reagent water
- Sample containers
- Cross contamination in shipment
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory
- Laboratory reagents used in analytical procedures

A trip blank consists of a set of 40 ml sample vials filled at the laboratory with laboratory demonstrated analyte free water. Trip blanks should be handled, transported and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, they just travel with the sample cooler. Trip blanks must accompany samples at a rate of one per shipment. The temperature of the trip blanks must be maintained at 4°C while on-site and during shipment. Trip blanks must return to the laboratory with the same set of bottles they accompanied in the field.

The purpose of a trip blank is to control sample container preparation and blank water quality as well as sample handling. Thus, the trip blank travels to the Site with the empty sample container, and back from the Site with the collected samples, in an effort to simulate sample handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality. Trip blanks are implemented only when collecting water samples, and analyzed for VOCs only.

7.14 Matrix Spikes/Matrix Spike Duplicates and Spiked Blanks

Matrix spike samples and blanks are quality control procedures, consistent with NYSDEC ASP specifications, used by the laboratory as part of its internal Quality Assurance/Quality Control program. The matrix and matrix spike duplicates are aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. They are used to evaluate the matrix effect of the sample upon the analytical methodology as well as to determine the precision of the analytical method used. A matrix spike blank is an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The MSB is subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedure and frequency regarding the MS, MSD and MSB are defined in the NYSDEC ASP.

7.15 Method Blanks

A method blank is an aliquot of laboratory water or soil which is spiked with the same internal and surrogate compounds as the samples. Its purpose is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the NYSDEC ASP as follows:

The laboratory shall prepare and analyze one laboratory reagent blank (method blank) for each group of samples of a similar matrix (for water or soil samples), extracted by a similar method (separatory funnel, continuous liquid extraction or sonication) and a similar concentration level (for volatile and semivolatile soil samples only) for the following, whichever is most frequent:

- Each case of field samples received; or
- Each 20 samples in a case, including matrix spikes and reanalyses; or
- Each 7 calendar day period during which field samples in a case were received (said period beginning with the receipt of the first sample in that sample delivery group); or
- Whenever samples are extracted.

Volatile analysis requires one method blank for each 12-hour time period when volatile target compounds are analyzed.

Semivolatile and pesticide method blanks shall be carried through the entire analytical process from extraction to final GC/MS or GC/EC analysis, including all protocol performance/ delivery requirements.

.

APPENDIX E

HEALTH AND SAFETY PLAN

P.W. Grosser Consulting, Inc. • P.W. Grosser Consulting Engineer & Hydrogeologist, PC
630 Johnson Avenue, Suite 7 • Bohemia, NY 11716
PH 631.589.6353 • FX 631.589.8705 • www.pwgrosser.com
New York, NY • Syracuse, NY • Seattle, WA

SITE-SPECIFIC HEALTH AND SAFETY PLAN (SSHASP)

Site:	Captains Cove, NYSDEC Registry No. 1-30-032, and Li Tungsten, NYSDEC Registry No. 1-30-046 and USEPA NPL No. NYD986882860 Sites
Location:	Glen Cove, NY
Date Prepared:	October 2012
Project Description:	Bulkhead tieback inspection pits. 5 Test pits 5-7 feet deep, PID, radiation, lead/arsenic monitoring, dust and odor control, CAMP, soil management for quantity exceeding monitoring criteria.
Potential Chemical Hazards:	VOCs/SVOCs/PAHs, Lead, Arsenic, and radiation.
Status:	Inactive Site

SAFETY AND HEALTH POLICY FOR POSILLICO ENVIRONMENTAL

The purpose of this policy is to develop a high standard of safety throughout all operations of Posillico Environmental and to ensure that no employee is required to work under any conditions, which are hazardous or unsanitary.

We believe that each employee has the right to derive personal satisfaction from his/her job and the prevention of occupational injury or illness is of such consequence to this belief that it will be given top priority at all times

It is our intention here at Posillico Environmental to initiate and maintain complete accident prevention and safety training programs. Each individual from top management to the working person is responsible for the safety and health of those persons in their charge and coworkers around them. By accepting mutual responsibility to operate safely, we will all contribute to the well-being of our employees.

APPROVALS

By their signature, the undersigned hereby certify that this Site Specific Health and Safety Plan (SSHASP) has been reviewed, modified for site-specific hazards and approved for use.

PREPARER/INDUSTRIAL HYGIENIST — DATE

SAFETY DIRECTOR — DATE

PROJECT MANAGER — DATE

SITE SAFETY OFFICER — DATE

D&B PROJECT MANAGER — DATE

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Purpose

This Site Specific Health and Safety Plan (SSHASP) addresses the health and safety practices that will be employed by workers participating in test pit installation activities at the Bulkhead Test Pit Project.

The SSHASP includes procedures to be followed by Posillico Environmental (Posillico), Posillico subcontractors, and all third parties in order to avoid and if necessary, protect against health and/or safety hazards. Activities performed under this SSHASP will comply with Local City and State regulations as well as applicable parts of OSHA 29 CFR Parts 1910 and 1926 regulations. The control copy of this SSHASP will be maintained on-site for the duration of work.

All workers who may participate in activities at the Site under the direction of Posillico are required to comply with the provisions specified in this SSHASP. All third parties who enter designated work zones must also comply with this SSHASP. All personnel entering the exclusion zone or contamination reduction zone are required to review and sign this SSHASP. Refusal or failure to comply with the SSHASP or violation of any safety procedures by field personnel and/or subcontractors performing work covered by this SSHASP may result in immediate removal from the site following consultationn with the Project Superintendent (PS) or the Site Safety Officer (SSO).

In addition to the items discussed in this SSHASP, all of the rules, regulations and requirements of the most recent edition of Posillico's Corporate HASP are in effect during all site related activities.

1.2 Scope

This SSHASP has been developed to address the health and safety concerns at the Site during remedial actions under the direction of Posillico. Although the SSHASP addresses all activities listed below, work at individual locations may include all, or only some of these tasks.

The SSHASP will address all of the activities associated with the tasks to be performed on site and will be modified as the project progresses and the associated scopes change.

1.3 Application

The SSHASP applies to all personnel involved in the above tasks that are under the direction of Posillico, who wish to gain access to active work areas, including but not limited to:

- Federal, State or local representatives;

- The Property Owners and their Representatives;
- Visitors to the Site;
- General Contractor employees; and
- General Contractor subcontractors.

In the event non-Hazardous Waste Operations and Emergency Response (HAZWOPER) trained personnel enter the site for a visit, they will undergo a brief site orientation by the Site Safety Officer and will not be permitted to enter the Contamination Reduction Zone or the Exclusion Zone and while on site will be escorted by the Site Safety Officer, the Newport Project Manager, and/or the Construction Oversight Engineer while continually monitoring the atmosphere with a Photo Ionization Detector (PID). If personnel monitoring action levels (outlined in Table 6-1) reach level C Personal Protective Equipment (PPE) requirements, the visitors will exit the site until levels permit re-entry.

1.4 SSHSP Changes and Ammendments

This SSHASP is a living document. At times throughout the project changes to site operations and conditions may require changes to safety procedures. Any alteration, change or ammendment to the SSHASP will be documented, discussed and approved by Glen Cove IDA, Owner's Engineer, Posillico PM, and Posillico SSO. When changes to the SSHASP are completed, they will be discussed with the site crew during the daily safety meetings.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies Posillico project organization and responsibilities. All Posillico personnel, including its subcontractors, will be responsible for adherence to the safety procedures during the performance of this project. Deviations from this SSHASP will not be allowed without express consent of the Posillico Safety Director (PSD). Project management and field supervisors for subcontractors are responsible for ensuring that their personnel will follow the procedures of this SSHASP. Violations of this SSHASP will result disciplinary action up to and including dismissal from site operations.

2.1 Project Manager (PM)

The PM responsibilities include the following:

- Ensures implementation of the SSHASP;
- Participates in incident investigations;
- Ensures the SSHASP has all of the required approvals before any site work is conducted; and
- Ensures the Labor Foreman, SSO, and PSD are informed of project changes which require modifications of the site safety plan.

2.2 Posillico Safety Director (PSD)

The PSD responsibilities include the following:

- Assists in the development and approval of the SSHASP;
- Approves revised or new safety protocols for field operations;
- Approves individuals who are assigned Health and Safety responsibilities;
- Coordinates revisions of this SSHASP with field personnel;
- Assists in Coordinating upgrades or downgrades of personal protective equipment with the PM and the site SSO;
- Assists with safety walkthroughs and safety inspections;
- Assists with the implementation of the SSHASP; and

- Assists in the investigation of all accidents/incidents.

2.3 Site Safety Officer (SSO)

The Site Safety Officer responsibilities include the following:

- Ensures that all health and safety activities identified in this SSHASP are conducted and/or implemented;
- Determines upgrades or downgrades of personal protective equipment (PPE) based on site conditions and/or real-time monitoring and personnel sampling results;
- Identifies operational changes which require modifications to health and safety procedures and site safety plans, and ensures that the procedure modifications are implemented and documented through changes to the SSHASP, with PSD approval;
- Directs and coordinates health and safety monitoring activities;
- Ensures proper personal protective equipment is utilized by field teams;
- Conducts weekly safety inspections of work areas;
- Monitors compliance with this SSHASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves revised or new safety protocols for field operations;
- Approves individuals who are assigned health and safety responsibilities;
- Coordinates revisions of this SSHASP with field personnel;
- Assists in the investigation of accidents/incidents;
- Performs real-time monitoring and personnel sampling and reporting/recordkeeping;
- Obtains copies of all required certifications/licenses for personnel to be on-site;
- Rotates in conducting daily safety huddle with PM.

- Coordinates health and safety monitoring activities with PS/PM; and

2.5 Site Personnel

The Site Personnel responsibilities include the following:

- Report any unsafe or potentially hazardous conditions to the PM and SSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in the SSHASP;
- Comply with rules, regulations and procedures as set forth in this SSHASP and any revisions;
- Prevent admittance to work sites by unauthorized personnel; and
- Inspect all tools and equipment, including PPE, prior to use each day.

2.6 Subcontractors

At a minimum, subcontractors will comply with this SSHASP. If necessary, a SSHASP Addendum or Job Hazard Analysis will be prepared for subcontractor tasks and will be added to this SSHASP to cover additional hazards. The General Contractor will evaluate the safety performance of its on-site subcontractors in the same manner that it evaluates its own performance. All Posillico subcontractors will be required to sign the SSHASP acknowledgement form located in Section 13.0, to attend daily safety meetings, and to notify the PM, SSO and Labor Foreman of planned operations at the beginning of each day.

Subcontractors will provide:

- A written description of required safety needed for the job;
- Applicable safety training and medical surveillance documentation as well as licenses and certifications; including medicals (if required).
- The name and telephone number of the SSO responsible for safety on site.

2.6.1 Truck Driver Policy

All truck drivers will adhere to site traffic rules including no idling to prevent unnecessary perimeter air alarms, staying on designated haul roads, adhering to the direction or spotters, and following the designated trucking route. A truck driver orientation will be prepared prior to the commencement of trucking, which will be sign by each transporter of contaminated material. There will be a zero tolerance policy for drivers who do not adhere to the site traffic rules.

3.0 POTENTIAL HAZARDS AT THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.2. A Hazard Communication Program is included in Appendix B. The Hazard Communication Program describes the procedures for determining hazards posed by a chemical, providing proper training on those hazards and transmitting the hazard information to those who could come in contact with the chemical.

3.1 Chemical Hazards

The characteristics of compounds at the Site are discussed below for informational purposes. Adherence to the safety and health guidelines in this SSHASP will reduce the potential for exposure. Personnel shall familiarize themselves with the characteristics of the known chemicals and their properties. Listed below is the chemical information regarding exposure for the following chemicals.

3.1.1 Semi-Volatile Organic Compounds/Polycyclic Aromatic Hydrocarbons

Semi-Volatile Organic Compounds (SVOCs) are present at the Site in impacted soil and groundwater in the sorbed phase, dissolved phase, or in the gas phase. These compounds generally have a depressant effect on the central nervous system (CNS), may cause chronic liver and kidney damage, and some are suspected human carcinogens. The primary routes of exposure include inhalation, skin absorption or ingestion. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation.

Polycyclic aromatic hydrocarbons (PAHs) are present at the Site in impacted soil and groundwater. These compounds generally have a depressant effect on the CNS, may cause chronic liver and kidney damage, and some are suspected human carcinogens. The primary routes of exposure include inhalation, skin absorption or ingestion. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation.

Benzene is present at the Site in impacted soil and ground water. This compound may affect the bone marrow and blood production. The primary routes of exposure are inhalation, absorption and ingestion. Acute exposure may include drowsiness, dizziness and unconsciousness.

Hydrogen Sulfide is present at the Site in impacted soil in the gas phase. This gas generally has adverse effects on eyes and the respiratory system. The primary route of exposure is inhalation. Acute exposure may include dizziness, headache, nausea, coughing and vomiting.

Hydrogen Cyanide is present at the Site in impacted soil. This compound has effects on the respiratory system. The primary routes of exposure are inhalation, ingestion and skin absorption. Acute exposure may include weakness, confusion, vertigo, fatigue, nausea and vomiting.

Mercury is present at the Site in impacted soil. This compound has effects on the nervous system and kidneys. The primary routes of exposure are inhalation, absorption and ingestion. Acute exposure may include dyspnea, elevated body temperature, headaches; fatigue and weakness.

Information on SVOC/VOC and PAH permissible exposure limits (PELs) are located in Table 6.1 (Real Time Air Monitoring Action Levels).

3.1.2 Metals

The Site potentially contains elevated levels of metals including arsenic and lead. The primary routes of this exposure for these compounds are inhalation (of particles containing these compounds) and ingestion. Acute exposure to arsenic may cause dermatitis, gastrointestinal (GI) disturbances and respiratory irritation. Chronic exposure to arsenic has resulted in lung cancer in humans.

Acute exposure to Lead may cause irritated eyes, skin; cough, chest pain, dyspnea (i.e., breathing difficulty), bronchitis, headache, irritability and salivation. Chronic effects of Lead include gastrointestinal disturbance, anorexia, weight loss, proteinuria, tremor and insomnia.

3.1.3 Other Chemical Hazards

Methane and Carbon Monoxide may also be present onsite. Methane can be produced during the natural decomposition of organic compounds in soil. Carbon Monoxide is a byproduct of petroleum combustion and is present in the exhaust of site machines, vehicles, and equipment. However, because of the openness of the site and excavation being done in the open air, Methane and Carbon Monoxide are not anticipated to be a serious concern. Radioactive material is also a potential to exist on site.

Radiation may be present on the site. Radiation may have an adverse effects on tissue cells and is considered a carcinogen. The primary routes of exposure are absorption, inhalation and ingestion. Acute exposure may include skin irritation, vomiting, nausea, headache, diarrhea and fevers.

Chemicals not identified in this SSHASP may be used during investigation and remediation activities. Prior to the initiation of these tasks, Material Safety Data Sheets (See MSDS Binder) will be obtained for each of the chemicals to be used and all site workers and visitors who may potentially be exposed will be made aware of these hazards. As part of the hazard communication requirments (Appendix B), a separate MSDS binder will be maintained in the General Contractor's on-site trailer, as per Hazard-Communication Program 29 CFR Subsection 1910.1200.

3.2 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects and plants. Workers will be instructed in hazard recognition, health hazards, and control measures during site-specific training.

3.2.1 Animals

During the conduct of site operations, wild animals such as stray dogs or cats, raccoons, rats, birds and mice may be encountered. Workers shall use discretion and avoid all contact with wild animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting the City of Glen Cove Animal Shelter at 516-676-5913

3.2.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, ticks and spiders, may be present at the Site making the chance of a bite possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition; any individuals who have been bitten or stung by an insect should notify a supervisor immediately. The following is a list of preventive measures:

- Apply insect repellent prior to performing any field work and as often as needed throughout the work shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- Field personnel who may have insect allergies shall have bee sting allergy medication on site and should provide this information to the PM and SSO prior to commencing work.

- It is recommended that personnel check themselves when in areas that could harbor insects, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetated areas.

3.2.3 Plants

The potential for contact with poisonous plants exists when performing fieldwork in undeveloped and wooded areas. During clearing and grubbing of the site, poison ivy, sumac, and oak may be encountered. Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac has white, "hairy" berry clusters. Poison oak can be present as a sparingly branched shrub. Poison oak is similar to poison ivy in that it has the same leaflet configuration; however, the leaves have slightly deeper notches. Prophylactic application of Tecnu (i.e., commercially available skin cleanser) may prevent the occurrence of exposure symptoms. Post exposure over the counter products are available and should be identified at the local pharmacist. Susceptible individuals should notify the PM or SSO.

Contact with poison ivy, sumac, or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin which needs first aid treatment. If you believe you have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

A medical fact sheet will be kept in all personnel files by the site safety officer. The confidential fact sheet will include information on all allergies, medications, and emergency contact information.

3.3 Physical Hazards/Safety Considerations

A variety of physical hazards may be present during Site activities. The most common hazards are struck-by/against hazards; slips, trips, and falls; equipment hazards and temperature extreme (cold and heat) stress. Other physical hazards are due to the use of hand and power tools and material handling. Additional specific safety requirements may be covered during safety briefings at the Site.

During all activities, personnel shall strictly adhere to the following:

- The buddy system (i.e., two or more workers assigned to a task to assist each other to safely get the task done) or line of sight (making sure equipment operators or workers view of the work area is not blocked) will be used during intrusive work; and

- If field personnel perceive an unsafe condition or situation, the SSO will be notified immediately .

3.3.1 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The procedures to be followed are found in Appendix C.

3.3.2 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. A heat stress prevention program will be implemented when ambient temperatures exceed 70°F for personnel wearing impermeable clothing. The procedures to be followed and methods for employee physiological monitoring are found in Appendix D.

3.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Site workers who will perform suspected high noise tasks and operations for short durations (less than 1-hour) would be provided with hearing protection devices. If deemed necessary the PS and SSO will be consulted on the need for additional hearing protection and the need to monitor sound levels for site activities. Posillico's corporate hearing conservation program is attached as Appendix E and is provided for example purposes only.

3.3.4 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel at all times when utilizing hand and power tools and GFI-equipped circuits will be used for all power tools. Tool inspections will be conducted prior to each work shift by labor force that will use the tool. Damaged tools will be tagged out of service and repaired. Additional procedures to be followed when using hand and power tools are attached in Appendix F.

3.3.5 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Excavation at the sites will cause uneven footing in the trenches and around the spoil piles. Daily housekeeping inspections of the work areas will be conducted to identify, eliminate, and control slip trip and fall hazards.

3.3.6 Fire and Explosion

When conducting excavating activities, the opportunity of encountering fire and explosion hazards exists from contamination in the soil and the possibility of free product in the underground pipelines. This will be especially hazardous when pipelines are sawed or broken to grout the ends. Before an inactive utility line can be sawed or broken for capping purposed, a Line Break Permit is required to be duly executed by the PM and reviewed by the SSO. See Appendix G for an example of the Line Break Permit.

For utilities (pipelines) that are determined to be inactive, initial penetration of the utility line will involve use of spark-proof drilling tools to create a small hole in the utility line. (A utility deemed active would be handled by its respective utility owner.) Access to the interior of the line will allow initial screening of the internal atmosphere with a combustible gas indicator (CGI)/O_2/H_2S/HCN meter and PID/FID, as described in Section 6. Action levels presented in Table 6-1 will be used to determine if a dangerous or explosive atmosphere is present within the utility line. If screening indicates that a potentially explosive environment exists within the utility line, one or both of the following activities will be taken to mitigate flammable vapors:

- Purge or ventilate the utility line; and or
- Inert the utility line with a non-reactive gas (e.g. carbon dioxide or nitrogen).

Prior to and during purging or inerting of the utility line, all potential sources of ignition will be removed from the immediate work area. Once screening has identified acceptable conditions within the utility line, a non-sparking saw, such as a “Nibbler”, or similar, will be used to cut and remove a section of pipe. The process will be continued until all residual products can be extracted and containerized.

Additionally, the use of a diesel engine on excavating equipment could present the possibility of encountering fire and explosion hazards. See Section 8.0 of the most recent edition of the Posillico Corporate HASP for reference on further precautions and procedures in dealing with Fire and Explosions.

In the event that a fire or explosion is serious enough to warrant evacuation or coordinated emergency response; all employees will be instructed to follow the Emergency Response/Contingency Plan in Section 10.0 of this document.

3.3.7 Manual Lifting

Manual lifting of heavy objects such as sections of pipe may be required. Failure to follow proper lifting technique can result in back injuries and strains. Site workers will be instructed to use power equipment to lift heavy loads whenever possible and to evaluate loads before trying to lift them (i.e. they should be able to easily tip the load and then return it to its original position).

Carrying heavy loads with a buddy and proper lifting techniques:

1) Make sure footing is solid.
2) Make back straight with no curving or slouching.
3) Center body over feet.
4) Grasp the object firmly and as close to your body as possible.
5) Lift with legs.
6) Turn with your feet, to avoid stress in the lower back.

Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods. In addition, hand digging for pipes may present lifting/ergonomic hazards.

3.3.8 Heavy Equipment Operations

Excavators, loaders, bulldozers, compactors, and dump trucks will be utilized in trenching, excavation, and backfilling operations. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm. Prior to each work shift, operators will inspect their equipment using the Daily Equipment Checklist (or an equivalent form) attached in Appendix H, which also contains information on Motorized Vehicle and Equipment Operation. Dump truck inspections will be conducted and recorded prior to loading soils.
Heavy equipment will be operated under the following conditions:

- The operation of heavy equipment will be limited to authorized personnel specifically trained in its operation. The subcontractor site supervisors must provide this information to the PM and SSO.

- The operator will use the safety devices provided with the equipment, including seat belts. Backup warning indicators and horns will be operable at all times.

- While in operation, all personnel not directly required in the area will keep a safe distance from the equipment.

- Personnel directly involved in activity will avoid moving in the path of operating equipment or any portion thereof. Areas blinded from the operator's vision will be avoided. Spotters will be used when personnel may be in areas where the operator's view is obstructed.

- Additional riders will not be allowed on equipment unless it is specifically designed for that purpose.

- The following hand signals will be used specifically for heavy machinery operation in order to safely move equipment throughout the site:

Hand raised with palm facing forward	Stop vehicle/action
Hand raised and moving towards operator	Back up vehicle
Raising right/left arm	Move vehicle right/left

3.3.9 Lockout/Tagout

The use of power tools and extension cords may pose electrical hazards to workers. Additionally overhead electrical lines on the Site are of potential concern during excavation and trenching. Potential adverse effects of electrical hazards include shocks, burns, and electrocution, which could result in death.

Site personnel will assume that all electrical equipment (surface, subsurface and overhead and machinery/equipment) is energized, until a Posillico representative has designated the electrical equipment as de-energized. If the equipment cannot be designated as de-energized, work shall stop and the PM/SSO, PSD will meet to determine a safe path forward. Prior to beginning work personnel shall verify that the equipment is energized or de-energized in the vicinity of the construction area. Posillico's Control of Hazardous Energy Programs (Lock Out/Tag Out) is included in Section 8.0 of Posillico's Corporate HASP (Appendix E).

If power lines cannot be de-energized, the SSO will consult with LIPA safety personnel to determine the safe working distance from the energized line. Work tasks will only commence after determination that a safe working distance can be maintained and all personnel working in the area have been informed of the limitation, and received activity specific training.

In the event that an employee is seriously hurt from being electrocuted; all employees will be instructed to follow Posillico Emergency Response Plan in Section 10.0 of this document.

3.3.10 Activities in Proximity to Overhead and Underground Utilities

Extreme care will be used during the implementation of the test pit installation activities so as not to damage or interfere with existing utilities. Setbacks for overhead lines for all equipment and personnel are noted in Section 3.3.17.

In addition to overhead utilities, there are underground utilities that exist near the work area. Extreme care will be used during the implementation of the test pit installation activities so as not to damage or interfere with these underground utilities and Posillico shall support and protect these utilities if required. The Posillico Underground Utility Safety Procedures can be found in Section 8.0 of the most recent edition of Posillico's Corporate HASP.

3.3.11 Aerial Lift Usage

Workers on site may use various aerial lifts in the process of performing work tasks. Located in Section 8.0 of Posillico's Corporate HASP (Appendix E), are the procedures for safe aerial lift usage. The procedures are based on codes and standards adopted in the Work Smart Standards (WSS) for aerial lifts, along with manufacturers' recommendations and other standards that apply for Posillico activities.

3.3.12 Excavation and Trenching

Hazardous associated with excavation and trenching include engulfment, entrapment, bank collapse, contact with underground utilities, and water infiltration. When working inside an excavation or trench, these hazards need to be considered.

To support and protect the excavation in Area 1A and potentially in alternate Areas 5, 6 and 7 (if necessary) of the project, Posillico will implement either a shoring box or a modular slide rail shoring system designed specifically for environmental remediation projects provided by American Shoring Inc. or an equal. The system will be a P.E.-engineered system and will have a P.E. stamp on design drawings and specifications. The shoring box or slide rail system will allow Posillico to safely support excavation areas by shoring excavation walls on all four sides of the system.

The shoring system consists of four four-sided posts and side panels of various lengths depending on the size of the excavation area. As the ground is excavated the shoring system is lowered into the ground and the panels are added until the required excavation depth is achieved. Since each corner post is four-sided, panels can be added in all four directions. The next box will be adjacent to the previous excavation sharing a common wall. As the excavation in one area is completed, additional posts and panels are added to create a new shoring box enclosure.

A competent person, as defined by OSHA and approved by the SSO, who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to employees must determine the safety requirements for each excavation and for the shoring system. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

A more detailed list of Posillico's Trenching and Excavation Procedures are located in Section 8.0 of Posillico's Corporate HASP (Appendix E).

3.3.13 Confined Space Entry

All trenches or excavations deeper than five feet will initially be considered potential permit required confined spaces. Prior to entry, each excavation deeper than 5 feet will be monitored for oxygen content, combustible gases, and toxic gases and vapors. When atmospheric conditions are below action levels, normal entry will be permitted and monitoring will be continued. If action levels are exceeded, the trench will be immediately vacated, and the area will then be re-classified as a Permit Required Confined Space. All entry into an excavation or trench classified as a Permit Required Confined Space will be performed in accordance with Section 8.0 of Posillico's Corporate HASP (Appendix E) and Appendix I, Confined Space Entry.

3.3.14 Fall Protection

Posillico requires 100 percent tie-off for working heights in excess of above 6 feet of a working surface. During the test pit installation, there is a potential for injuries caused by falls from unprotected leading edge at the existing bulkhead. Posillico shall take precautions to ensure that all leading edges of excavations and trenches are protected in accordance with OSHA 29 CFR 1926. If during the excavations a worker is required to assist the process in an aerial lift, they shall be protected from falls by an appropriate harness and latching system as described in OSHA CFR 1926. Posillico's Fall Protection Program is located in Section 8.0 Posillico's Corporate HASP (Appendix E).

3.3.15 Welding and Cutting Safety Rules

Hazards associated with welding and cutting include noxious fumes, potential contact with heated materials, sharp edges, eye retina damage from ultraviolet light, and fire hazards. To mitigate exposure to hazards, all employees performing welding and cutting on site must adhere to Posillico's Welding and Cutting Safety Rules attached in Appendix J.

3.3.16 Steam, Heat, Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds. Proper PPE will be worn during all steam cleaning activities including rain gear or Tyvek, hardhat equipped with splashguard, and water resistant gloves and boots.

3.3.17 Electrocution

The use of power tools and extension cords may pose electrical hazards to workers if power cords become damaged, exposing the bare wire. Cords will be inspected prior to use and taken out of commission or repaired if damaged. Additionally overhead or underground electrical lines are of potential concern during excavation, trenching, sheet pile driving, tent mobilization and demobilization. Site specific precautions will be followed to maintain a safe working distance and to alert all workers to the electrical dangers. Underground utilities will be located (see Section 3.3.10) and surveyed using "soft dig" techniques, which involves utilizing hand tools to safely excavate without severing buried pipes/lines/conduit. Warning signs will also be posted to demarcate the required offsets for the overhead electrical lines. All equipment and personnel will be required to maintain setbacks of ten (10) feet for the energized overhead electrical line. Potential adverse effects of electrical hazards include shocks, burns, and electrocution, which could result in death.

3.3.18 Severe Weather

Outdoor operations will cease in the event of severe weather conditions as decided by the SSO, Engineer, PM, or Labor Foreman. Severe weather may include but not limited to heavy rains, high winds, snow and ice. All heavy equipment use will cease prior to the onset of a thunderstorm regardless of the stage of activity. Work will continue 30 minutes after thunderstorm, work continuation after other severe weather will be determined by SSO and/or competent person overseeing operation.

4.0 ACTIVITY HAZARD ANALYSIS

Activity Hazard Analysis (AHAs) are a systematic way of identifying the potential health and safety hazards associated with the activities required for completion of the work and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during training prior to each phase of work.

Below is a Project Wide AHA developed for this project. Additional and more detailed AHAs will be developed for specific work tasks prior to the commencement of each activity.

Phase of Work: Mobilization/Demobilization
Tasks: Mobilization and Demobilization of Equipment and Supplies, Establishment of Site Security, Work Zones and Staging Areas, Site restoration (re-establishment of stabilization cover, site grading, replacement of fences, etc.).

HAZARDS	CONTROL MEASURES
Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas; • Walk, do not run; and • Wear footwear with soles that grip.
Manual lifting and material handling	• Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
Temperature extremes	• Drink plenty of fluids; • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; • Stay in visual and verbal contact with your buddy; and • Use Cold Stress and Heat Stress program.
Hand tool usage	• Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; and • Use in accordance with manufacturer instructions.
Back injuries	• Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift; get help for heavy or awkward loads, clear path. • Site personnel will be instructed on proper lifting techniques; mechanical devise should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.

HAZARDS	CONTROL MEASURES
Vehicular Traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
Overhead Hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • All ground personnel will stay clear of suspended loads; • All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • All overhead hazards will be identified prior to commencing work operations.
Noise	• Ear plugs or ear muffs.
Dropped Objects	• Boots meeting ANSI Standard Z41 will be worn.
Eye Injuries	• Safety glasses meeting ANSI Standard Z87 will be worn.
Fire/Explosion	• ABC type fire extinguishers shall be readily available; • And no smoking in work area.
Electrocution	• Equipment will be equipped with GFCI; • All electrical work will be conducted by a licensed electrician; • All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.
Pinch/Cut/Smash	• Cut resistant Kevlar work gloves will be worn when dealing with sharp objects; • All hand and power tools will be maintained in safe condition; and • Guards will be kept in place while using hand and power tools.
Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.3 for tick bites; • PS should be aware of on-site personnel with allergic reactions in insect bites and stings. A medical fact sheet will be kept by the SSO for each site personnel.
Equipment Fueling	• Turn equipment off while refueling to eliminate ignition source • Make sure gas can/funnel will be bonded to gas tank of equipment being fueled.

Phase of Work: Pre-Construction and Site Preparation

Tasks: Delineate and Protect Utilities located on site and those leading to and from the Site, Site Preparation (installation of soil erosion measures, etc.) and Clearing and Grubbing, Prepare decontamination pads and facilities

HAZARDS	CONTROL MEASURES
Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas; • Walk, do not run; and • Wear footwear with soles that grip.
Manual lifting and material handling	• Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
Temperature extremes	• Drink plenty of fluids; • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; • Stay in visual and verbal contact with your buddy; and • Use Cold Stress and Heat Stress program.
Hand tool usage	• Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; and • Use in accordance with manufacturer instructions.
Back injuries	• Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift; get help for heavy or awkward loads, clear path; and • Site personnel will be instructed on proper lifting techniques; mechanical devise should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
Vehicular Traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
Overhead Hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • All ground personnel will stay clear of suspended loads; • All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • All overhead hazards will be identified prior to commencing work operations.
Noise	• Ear plugs or ear muffs.
Dropped Objects	• Boots meeting ANSI Standard Z41 will be worn.
Eye Injuries	• Safety glasses meeting ANSI Standard Z87 will be worn.

HAZARDS	CONTROL MEASURES
Fire/Explosion	• ABC type fire extinguishers shall be readily available; and • And no smoking in work area.
Electrocution	• Equipment will be equipped with GFCI; • All electrical work will be conducted by a licensed electrician; and • All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.
Pinch/Cut/Smash	• Cut resistant Kevlar work gloves will be worn when dealing with sharp objects; • All hand and power tools will be maintained in safe condition; • Guards will be kept in place while using hand and power tools; • Stand clear of branches being sent through the chipper; • Stand clear of moving parts; • Recognition/communication of potential pinch points; and • Use tag lines to prevent branches from striking picker bucket.
Flying Debris	• Wear necessary PPE, Eye protection, face shield.
Chain Saw Kick Back	• Use of appropriate extra PPE (face shield, chaps, leather work gloves, etc.); • Only trained personnel operating tools; and • Inspection of tools and all components.
Falling Objects	• Make sure work area is clear before cutting branches or trees; • Alert others of your actions prior to performing them; • Wear proper PPE (safety glasses, hard hat, sturdy leather work boots, etc.); and • Use tag lines to soften fall of large branches.
Chipper jam	• Ensure wood chipper is turned off before performing any maintenance.
Falls	• Wear appropriate fall protection when working at heights of 6’ or greater; • Inspection of all fall protection components prior, during, and after use (harness, lanyard, etc.); and • Ensure training on operation of bucket.
Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.3 for tick bites; and • PM should be aware of on-site personnel with allergic reactions in insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files.

Phase of Work: Construction Activities
Tasks: Support of existing utilities (if necessary)
Install Support of Excavation System

HAZARDS	CONTROL MEASURES
Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas; • Walk, do not run; and • Wear footwear with soles that grip.
Stability of terrain/landslide	• **Assessment** of ground conditions (soil stability, presence of water, etc.) prior to start of activity. If any conditions are deemed less than adequate by a competent person on site, work will cease until conditions improve; and • Ensure footing is stable before attempting to navigate terrain.
Manual lifting and material handling/ ergonomic concerns	• Utilize proper lifting techniques (bend at the knees instead of the back to reduce unnecessary strain); • Carry loads close to your body; • Do not twist your body when handling loads; shuffle your feet instead; • Do not attempt to lift anything that is too heavy or awkward to lift alone, get another individual to assist in the lift or have a piece of equipment move the item; and • Wear proper PPE (leather gloves) to guard against potential puncture hazards when handling debris.
Heavy equipment maneuverability/ working near heavy equipment	• Ensure proper stability of area where equipment will operate; • Ensure daily equipment **inspections** are completed to make sure all lights, horns, and alarms are working properly; • Wear seatbelts at all time while operating equipment; • No electronic devices (cell phones, music players, etc.) will be used while operating equipment; • Ensure that ground personnel are out of the way of the excavator. If ground personnel need to work in close proximity to equipment, ensure that proper PPE (highly visible vests, hard hats, etc.) is worn at all times and Laborers and Operators verbally review non-verbal communication before activity begins; and • Ensure that emergency procedure located in SSHASP is communicated to all individuals involved in the activity.
Hand tool usage	• Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; and • Use in accordance with manufacturer instructions.

HAZARDS	CONTROL MEASURES
Vehicular Traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
Overhead Hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • All ground personnel will stay clear of suspended loads; • All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • All overhead hazards will be identified prior to commencing work operations.
Utilities	• Prior to any intrusive activities and every 45 days, utility markouts will be performed using New York One Call to identify the locations of utilities in the site area.
Dropped Objects	• Boots meeting ANSI Standard Z41 will be worn.
Eye Injuries	• Safety glasses meeting ANSI Standard Z87 will be worn.
Cave-in	• Ensure that cuts are sloped at a 1 ½ : 1 ratio; • If Laborers are to enter the excavation, ensure that ladders are accessible at no more than 25’ from every area of the excavation. Ensure proper ladders are used (extension ladders); ensure they are inspected for deficiencies; ensure that extension ladders extend 3’ above the landing and are placed on a stable surface when accessing/exiting the excavation; • Ideally, any excavation with ample space on one side of the cut will contain a ramp on one side for access and egress that is at an angle of 30°; and • Laborers will not be permitted to enter any excavation which contains standing water.
Electrocution	• Equipment will be equipped with GFCI; • All electrical work will be conducted by a licensed electrician; • All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.
Pinch/Cut/Smash	• Cut resistant Kevlar work gloves will be worn when dealing with sharp objects; • All hand and power tools will be maintained in safe condition; and • Guards will be kept in place while using hand and power tools.
Rigging	• Proper rigging techniques must be used at all times; • Ensure that **inspections** of all rigging components are completed prior to use. Any components found to be defective or in less than optimal condition will be removed from service before commencement of operation; • Make sure the appropriate PPE is utilized (especially gloves to guard against abrasions and lacerations); and

HAZARDS	CONTROL MEASURES
	• Rigging must be rated for lift, do not exceed load capacities. • Only qualified personnel can participate in rigging activities.
Welding and Burning	• Keep work area clear of debris and garbage which could ignite from sparks • Complete hot work permit and gain approval from SSO • Have fire watch with fire extinguisher
Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.3 for tick bites; and • PM should be aware of on-site personnel with allergic reactions to insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files.

Phase of Work: Excavation and Backfilling

Tasks: Benching for slope protection in the excavation areas, Protect and support excavation areas in proximity to overhead and underground utilities, Excavation of materials (contaminated and non-contaminated), Staging and stockpiling materials (contaminated and non-contaminated), Removal of subsurface obstructions, and Backfill and compaction of excavation areas.

HAZARDS	CONTROL MEASURES
Chemical	• Wear appropriate PPE; • Perform air monitoring per Tables 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking, or smoking.
Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Personnel will use caution when working on slopes, plastic, wet or muddy areas, or oily areas; • Walk, do not run; and • Wear footwear with soles that grip.
Temperature extremes	• Drink plenty of fluids; • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; • Stay in visual and verbal contact with your buddy; and • Use Cold Stess and Heat Stress Programs (Appendix C & D).
Steam, Heat Splashing	• Use face shield and safety glasses or goggles; • Stay out of the splash/steam radius; • Do not direct steam at anyone; • Do not hold objects with your foot or hands and steam area near it; • Ensure that direction of spray minimizes spread of constituents of concern; • Use shielding as necessary; • Pressure washer will be equipped with a dead man's switch; and • Use wand extenders.
Back injuries	• Follow proper lifting techniques: lift with legs, keep load close to the body, do not bend or twist with load, test load prior to lift, get help for heavy or awkward loads, clear path; • Site personnel will be instructed on proper lifting techniques; • Mechanical devices should be used to reduce manual handling of materials; and • Team lifting should be utilized if mechanical devices are no available.
Vehicular Traffic	• Spotters will be used when backing up trucks and heavy equipment

HAZARDS	CONTROL MEASURES
	and when moving equipment.
Overhead Hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • All ground personnel will stay clear of suspended loads; • All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • All overhead hazards will be identified prior to commencing work operations.
Noise	• Ear plugs or ear muffs.
Eye Injuries	• Safety glasses meeting ANSI Standard Z87 will be worn.
Fire/Explosion	• ABC type fire extinguishers shall be readily available; and • No smoking in work area.
Under Ground Utility Strike	• Perform test pits, soft dig, utility markouts prior to excavation • Review corporate utility clearance procedures
Electrocution	• Equipment will be equipped with GFCI; • All electrical work will be conducted by a licensed electrician; and • All equipment will stay a minimum of 10 feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.
Pinch/Cut/Smash	• Cut resistant Kevlar work gloves will be worn when dealing with sharp objects; • All hand and power tools will be maintained in safe condition; and • Guards will be kept in place while using hand and power tools.
Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.3 for tick bites; and • PM should be aware of on-site personnel with allergic reactions of insect bites and stings. A medical fact sheet will be held onsite by the SSO in the personnel files.
Radiation	• Actively monitor for radiological activity in disturbed material; • Minimization of hand-to-mouth contact in exclusion zone; and • Wear appropriate PPE (work clothes, gloves, potentially chemical protective clothing) to guard effectively against alpha particles.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Specific information on the selection rationale for each activity and storange and maintenance of PPE an can be found in Section 4.0 and Appendix K - Personal Protective Equipment (PPE): Selection and Use. For the purposes of PPE selection, the SSO and PSD are considered competent persons, as defined by OSHA. The signatures on the front of the SSHASP constitute certification of the hazard assessment. For activities not identified in this SSHASP, the SSO or PSD will conduct the hazard assessment and select the PPE using the information provided in Appendix K. Prior to any upgrade or downgrade of PPE the Construction Manager will be notified. Instruction be given by the SSO on the proper selection of PPE and this will be followed-up by periodic field inspections.

5.1 PPE Requirements

At a minimum, it is mandatory for all persons entering the Site to wear a Hard Hat, High Visibility Vest, steel-toe work boots, hearing protection and ANSI approved eyewear. If levels of radiation are present, no matter how minor, gloves will be required to be worn for the activity to guard against alpha particle penetration and inadvertent particle accumulation on the hands, which can then enter the digestive tract once in contact with the mouth.

In addition, Posillico will provide its employees with PPE meeting the following standards:

- Personnel entering within *5 feet of any energized electrical equipment* OR entering within *10 feet of energized overhead electrical lines* OR working within *10 feet of equipment with electrical potential* that is within 10 feet of overhead lines (i.e. excavator bucket) must be wearing fire resistant clothing as is dictated through OSHA standards: "Apparel which meets the flame resistant clothing requirements of the American Society For Testing and Materials (ASTM) standard, ASTM F1506-1994, is acceptable under all flame and electric arc hazard conditions for compliance with the paragraph 1910.269(l)(6)(iii) standard." This includes long pants and long-sleeved shirts to provide protection from burns in the case of coming in contact with electrical arcing. Shirts will meet FR-1 (with 100% cotton undershirts) and pants will meet FR-2 protection.

Throughout the workday, real time monitoring using portable instrumentation will be performed by a qualified technician, as deemed so by the SSO, in order to identify potentially hazardous environments. If an elevated level of contaminant is encountered, appropriate upgrades to PPE will be made (following table 6-1 and Section 6.0 accordingly).

Based on the potential chemical and physical hazards on site, the following personal protective equipment will be used during all work activities or as required depending on the task and hazard.

HEAD PROTECTION HH = Hard Hat HEARING PROTECTION EP = ear plugs EM = ear muffs	EYE/FACE PROTECTION APR = Full Face Air Purifying Respirator MFS = Mesh Face shield PFS =Plastic Face shield SG = ANSI approved safety glasses with side shields	FOOT PROTECTION Neo = Neoprene OB = Over boot Poly = polyethylene coated boot Rub = rubber slush boots STB = Steel-toe leather work boots
HAND PROTECTION Cot = cotton But = Butyl LWG = Leather Work Gloves Neo = Neoprene Nit = Nitrile	BODY PROTECTION Cot Cov = Cotton Coveralls Poly = Polyethylene coated tyvek coveralls Saran = Saranex coated tyvek coveralls Tyvek = Uncoated paper tyvek coveralls WC = Work clothes FP= Fire Protective	RESPIRATORY PROTECTION Level D = No respiratory protection required Level C = Full face air purifying respirator with approved cartridges Level B = Full face air supplied respirator with escape bottle

TABLE 5-1

PERSONAL PROTECTIVE EQUIPMENT SELECTION

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/Demobilization							
Mobilization/ demobilization of equipment and supplies	HH	SG	OB	LWG	WC or FP as Required	EP as needed	Level D
Establishment of site security, work zones and staging area	HH	SG	STB	LWG	WC or FP as Required	EP as needed	Level D
Utility Connections	HH	SG	STB	LWG/ Nit	WC and/or FP/Poly as Required	EP as needed	Level D
Site Restoration	HH	SG	OB	LWG	WC or FP as Required	EP as needed	Level D
Pre-Construction and Site Preparation							
Delineate and Protect Utilities	HH	SG	STB	LWG	WC or FP as Required	EP as needed	Level D
Site Preparation	HH	SG	OB	LWG	WC or FP as Required	EP as needed	Level D
Clearing and Grubbing	HH	SG	OB	LWG	WC or FP as Required	EP as needed	Level D
Prepare	HH	SG	OB	LWG	WC or FP as	EP as needed	Level D

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Decontamination Pad and Facilities					Required		
Sheet Pile Installation Activities							
Welding/Sealing	HH	SG,PFS	STB	LWG	WC or FP as Required		
Construction Activities							
Heavy equipment decontamination	HH	SG, PFS	OB	Nit	WC, Poly	EP as needed	Level D
Soil Excavation and Backfill	HH	SG	OB	Nit	WC, Poly	EP as needed	Level C or D Level B only if radiation encountered and cannot be mitigated any other way.
Support, Abandonment and Installation of Utilities	HH	SG	OB	LWG , Nit	WC and/or FP/Poly as Required	EP as needed	Level D
Other Remediation Activities							
Operations & Maintenance Tasks (Dewatering System)	HH	SG	OB	Nit, LWG	WC or FP as Required	EP as needed	Level D
Soil and Groundwater Sampling Activities							
Soil Borings and Sampling	HH	SG	OB	Nit, LWG	WC, tyvek, Poly or FP as Required	EP as needed	Level D

*Level C PPE will only be used when VOC or mercury action levels are reached.

5.2 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134	ANSI Z88.1-1980
Head	29 CFR 1910.135	ANSI Z89.1-1969
Foot	29 CFR 1910.136	ANSI Z41.1-1967

ANSI = American National Standards Institute

5.3 Respiratory Protection Program

Any on-site personnel who have the potential to don a respirator must have a valid fit test certification and documentation of medical clearance. The SSO will maintain such information on file for Posillico personnel, Posillico subcontractors, and other third party personnel. The SSO will obtain such information from the subcontractor's site supervisor prior to the initiation of any such work.

Both the respirator and cartridges specified for use must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency;
- IDLH concentrations; and
- If contaminant levels exceed designated use concentrations.

In addition to the above requirements, a respiratory protection program has been developed in order to comply with 29 CFR 1910.134. The Posillico respiratory protection program is attached to this document as Appendix L.

It should be noted that if elevated levels of VOCs and Mercury are to be found simultaneously, the work area will be evacuated until one of, if not both of the levels can be lowered or dissipate. If the material does not dissipate or be lowered by any other means, employees will be equipped with Supplied Air respirators and upgrade to Level B PPE to complete the work.

5.4 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is, as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough (the wearer can smell or taste the chemical), whichever occurs first; and

- If the humidity exceeds 85% and average PID/FID readings exceed 10 ppm, then cartridges shall be removed and disposed of after 4 hours of use. The SSO will insure this information is communicated to all respirator users and will insure that the cartridges are changed within the required time period.

Respirators cartridges must be removed from the respirator at the end of the day and disposed. Respirators must be cleaned at the end of each day and placed in a respirator storage bag when dry. Respirators must be stored in a cool, dry location.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding Site contaminants;

- Using the Rule of Thumb provided by the American Industrial Hygiene Association (AIHA);
- Total airborne concentration of contaminants is anticipated to be less than 100 ppm;
- The humidity is expected to be less than 85%; and
- Desorption of the contaminants (including those with poor warning properties, i.e. CO, H2S) after partial use of the chemical cartridge can occur after a short period (hours) without use (e.g., overnight) and result in a non-use exposure.

6.0 MONITORING

Qualified and trained personnel will perform environmental health and safety monitoring on site in accordance with this section.

This section only applies to monitoring workers and work zones for on-site activities and does not include community air monitoring which is covered in the site Perimeter Air Monitoring Plan (PAMP).

6.1 On-Site Monitoring During Remedial Activities

The type of onsite monitoring implemented will be appropriate for the activities performed. The following monitoring instruments will be available for use during field operation as necessary:

- Photoionization Detector (PID), Photovac Microtip with 10.6 eV lamp or equivalent; or
- Dust Meter, MIE Miniram model PDM-3 or equivalent;

The type of monitoring will be appropriate for the activities performed. All air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements and the Monitoring Instruments: Use, Care, and Calibration program included in Appendix M.

Organic vapor concentrations, arsenic and lead, and radiation shall be measured logged and recorded using the PID/XRF/Ludlam meters during excavating and other intrusive activities In addition, the readings from all meters will be manually recorded (e.g. in a log book) for each 2-ft lift. In addition, monitoring personnel will make a best effort to collect organic vapor concentrations from downwind of the intrusive activity and monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the action levels given in Table 6-1.

A dust meter shall be used to measure, log and record airborne particulate matter during intrusive activities. Monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the action levels given in Table 6-1. In addition, PID readings will be manually recorded (e.g. in a log book) at least once every half hour. Monitoring personnel will make a best effort to collect dust-monitoring data from downwind of the intrusive activity. If off-site sources are considered to be the source of the measured dust, upwind readings will also be collected.

TABLE 6-1

REAL TIME AIR MONITORING ACTION LEVELS

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
PID	Breathing Zone	0.5 ppm	Use detector tube for benzene. If levels >1/2 PEL are encountered (taking into account the slow response time of Draeger tubes) personnel will exit work area until detector tubes confirm benzene levels are < 1/2 PEL. Benzene tubes will be sampled at initial detection of >1/2 PEL for 15 minutes and will be checked every 2 hours thereafter or until work activities change.	1/2 of PEL for benzene
PID	Breathing Zone	0 - 25 ppm	No respiratory protection is required if Benzene concentration is <0.5ppm	
		25 - 250 ppm	Level C	
		> 250 ppm	Stop work, withdraw from work area; notify SSO.	
Oxygen meter	Breathing Zone	< 19.5%	Stop work; withdraw from work area; notify SSO.	Low oxygen
		> 22%	Stop work; withdraw from work area; notify SSO.	Oxygen enriched atmosphere; explosion hazard
Carbon Monoxide	Breathing Zone	<10ppm	Continue work operations	
		10-35ppm	Stop work, ventilate area	
H2S meter	Breathing Zone	<5 ppm	No respiratory protection is required	
		>5 ppm	Stop work, cover excavation, notify SSO	
Benzene	Work Area	<1 ppm	Continue work operations	
		1 ppm sustained for 15 minutes	Upgrade to level C	Short-term exposure limit (STEL)
		>50 ppm sustained for work shift	Stop work – investigate source	
Hydrogen Cyanide	Breathing Zone	<5ppm	No Respiratory protection required	

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
(HCN)		>5ppm	Stop work and notify SSO. Allow area to ventilate. Return to work after Level has dropped below 5 ppm.	
Combustible Gas Indicator (CGI)	Excavation	< 10 % LEL	Investigate possible causes, allow excavation to ventilate; use caution during procedures.	Increasing potential for ignition of vapors
		> 10% LEL	Stop work; allow excavation, borehole to ventilate to < 10% LEL; if ventilation does not result in a decrease to < 10% LEL, withdraw from work area; notify SSO.	Potential for ignition of vapors
Dust Meter	Excavation	<0.3 mg/m^3	Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water	Potential inhalation source for airborne contaminants adhering to dust; Level is below established PEL
		> 0.5 mg/m^3	Upgrade to Level C PPE	PEL for arsenic
Jerome Mercury Monitor or similar	Hazardous Mercury Excavation	< 0.05 mg/m3 to 0.05 mg/m3	No Action. Level D PPE	Level is well below PEL
		0.05 mg/m3 - 0.5 mg/m3	Level C PPE	
		0.51 mg/m3 - 2.5 mg/m3	Stop work and investigate. Alter work practices as necessary	Potential for over exposure to Mercury.
Individual Radiation Dosimiters or similar	Work Area Excavation	As Low As Reasonably Achievable <Background Level	Stop work and notify SSO. Use extreme caution while locating the source with Geiger Counter. Level B PPE upgrade may be necessary if radiation cannot be contained any other way.	Potential for over exposure to radiation

*It should be noted that if elevated levels of VOCs and Mercury are to be found simultaneously, the work area will be evacuated until one of, if not both of the levels can be lowered or dissipate. If the material does not dissipate or be lowered by any other means, employees will be equipped with Supplied Air respirators and upgrade to Level B PPE to complete the work.

*Based on 15-minute average readings

6.2 Personal Air Monitoring

Posillico will perform personal air monitoring according to the OSHA general standards at the commencement of ground intrusive operations and throughout the remedial work for Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), Napthalene, Hydrogen Cyanide (HCN), Hydrogen Sulfide (H2S), Polycyclic Aromatic Hydrocarbons (PAHs), Lead, Mercury and other Heavy Metals in order to verify the real time air monitoring results and to determine actual exposures. The results of the air monitoring will be compared to all applicable OSHA Permissible Exposure Limits (PELs).

Arsenic – 1926.1118 / 1910.1018(e) (1)
Determinations of airborne exposure levels shall be made from air samples that are representative of each employee's exposure to inorganic arsenic over an eight (8) hour period.

Lead - 1926.62(d) (1) (i)
Each employer who has a workplace or operation covered by this standard shall initially determine if any employee may be exposed to lead at or above the action level.

Benzene – 1926.1128 / 1910.1028(e) (1) (i)
Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's average exposure to airborne benzene.

1910.1028(e) (1) (ii)
Representative 8-hour TWA employee exposures shall be determined on the basis of one sample or samples representing the full shift exposure for each job classification in each work area.

Employee exposure monitoring will be carried out in accordance with NOISH standardized methods. These methods specify quality assurance/quality control (QA/QC) provisions for maintaining sampling and analytical integrity, precision and accuracy. Samples will be analyzed by a laboratory accredited by the American Industrial Hygiene Association (AIHA).

6.3 Data Quality Assurance

6.3.1 Calibration

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages. All instruments shall be calibrated before each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response. In the case of instrument failure, a backup instrument will be readily available to insure continuity in work.

6.3.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SM for reference.

6.4 Noise Monitoring

Work areas or tasks that pose an exposure risk greater than 85 dBA will require hearing protection. If there is a reasonable possibility that workers may be exposed to an 8-hour time-weighted average exceeding 85 dBA, noise monitoring will be conducted by the SSO. All monitoring and surveillance equipment will be operated, maintained and calibrated in accordance with the manufacturer’s instructions and the established quality assurance procedures. All equipment will be checked daily for proper operation. Field validation logs will be maintained on-site.

6.5 Temperature Extremes Monitoring

A cold stress prevention program will be implemented when ambient temperatures are below 50 F. Posillico’s cold stress program can be found Appendix C.

A heat stress prevention program will be implemented when ambient temperatures exceed 70 F for personnel wearing impermeable clothing and for other personnel when the wet bulb globe thermometer (WBGT) index exceeds the ACGIH TLVs. Heat Stress monitoring will be conducted in accordance with the Heat Stress monitoring program found in Appendix D.

7.0 ZONES, PROTECTION, AND COMMUNICATION

7.1 Site Control

Site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin for each task requiring such delineation (i.e. construction, excavation, trenching in impacted areas of the site).

Work zones will be clearly demarcated and well maintained. All zones will be identified by appropriate signage, caution tape, orange cones, orange fence or orange construction barrels. Maps will be available at the Site and used during initial site-specific training.

This project is being conducted under the requirements of 29 CFR 1910.120, and any personnel working in an area where the potential for exposure to site contaminants exists, will only be allowed access after proper training and medical documentation as required by Posillico. These records shall be maintained by the SSO, and copies will be provided to the PM prior to mobilization for project activities.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Support Zone - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for Exclusion Zone entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an exclusion zone. This zone will be clearly delineated by cones, tapes or other means. The PS may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site PS allowing adequate space for the activity to be completed, field members and emergency equipment.

7.2 Contamination Control

7.2.1 Decontamination Procedures

Personal and equipment decontamination will take place only in designated areas of the CRZ. Posillico will construct a decontamination area in order to contain all contaminated soils, sediments or water and used PPE. The area will be large enough to accommodate the equipment and personnel to be decontaminated.

Decontamination equipment may include the following:

- Wash Tubs
- Scrub Brushes
- Disposable Towels
- Seating to Facilitate Boot Cleaning
- Decontamination Solution
- Hand Soap
- Skin Wash Water Source
- Garbage Cans

7.2.2 Minimization of Contact With Contaminants

During completion of all site activities, personnel should attempt to minimize the degree of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

7.2.3 Personnel Decontamination Sequence

Consideration will be given to prevailing wind directions so that the decontamination line, the support zone, and contamination reduction zone exit is upwind from the exclusion zone and the first station of the decontamination line. Decontamination will be performed by removing all PPE used in EZ and placing in appropriate waste containers for disposal at the CRZ.

The following describes procedures to be employed for personal and equipment decontamination:

PERSONAL DECONTAMINATION PROCEDURES FOR LEVEL D PROTECTION

1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.

2. Scrub outer boot covers and gloves with decontamination solution or detergent/ water.

3. Remove outer gloves and deposit in waste container.

4. If clothing has become contaminated, remove it and place it into a poly bag.

5. Remove inner gloves and deposit in container with liner.

6. Wash hands and face if necessary.

7. Re-dress (as necessary) or put on clean clothes.

PERSONAL DECONTAMINATION PROCEDURES FOR LEVEL C PROTECTION

1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.

2. Scrub outer boot covers and gloves with decontamination solution or detergent/ water.

3. Rinse off decontamination solution from Step 2 (above).

4. Remove tape around boots and gloves and deposit in waste container.

5. Remove boot covers and deposit in waste container.

6. Remove outer gloves and deposit in waste container.

7. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty.

8. Remove safety boots and place in area with plastic liner.

9. With assistance of helper, remove splash suit. Deposit in waste container.

10. Remove respirator. Deposit in container with plastic liner. Avoid touching face with fingers.

11. Remove inner gloves and deposit in waste container.

12. If inner clothing has become contaminated, remove it and place it into a poly bag.

13. Wash hands and face, if necessary.

14. Put on clean clothes.

Note: One to two laborers (the decontamination team) may be use to assist in the decontamination of workers exiting the exclusion zone

7.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination; wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be moved to the exclusion zone boundary and decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury) provisions shall be made to ensure that emergency response personnel will be able to respond to victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with poly to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent chemical data.

7.2.5 Hand Held Equipment Decontamination

Hand held equipment includes all monitoring instruments, samples, and hand tools. The hand held equipment is dropped at the first decontamination station in the CRZ to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident.

Decontamination procedures for sampling equipment, hand tools, etc., shall include the use of steam cleaning or a detergent wash, as appropriate for the site conditions.

7.2.6 Heavy Equipment Decontamination

Decontamination of chemically contaminated heavy equipment will be accomplished using high-pressure hoses or with brushes and shovels (dry decon) in the CRZ. Decontamination shall take place on a decontamination pad and all liquids used in the decontamination procedure will be collected. Vehicles or equipment brought into an exclusion zone will be treated as contaminated, and will be decontaminated prior to removal. All decontamination rinse water will be collected and passed through the water treatment system prior to discharge into the local sewer. Additional information on the decontamination of heavy equipment can be found in the Material handling Plan.

7.2.7 Specific Procedures for Radiological Decontamination

Any areas (employee protective equipment, surveying equipment, tools, etc.) suspected to have come into contact with radiological material will be decontaminated using soap and water—washed, dried, and resurveyed to ensure that no radioactive material is lingering.

7.3 Communications

The following communications equipment shall be specified as appropriate:

- Telephones - A cellular telephone will be located in the SZ for communication with emergency support services/facilities and the home office. Personnel in the EZ can carry cellular telephones for communication as well if Level D PPE has been determined to be appropriate.

Hand Signals - Hand signals shall be used by field teams along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Please note that these hand signals will be the only hand	**Meaning**

signals used for non task-specific work for the site. Typical hand signals are the following:**Signal**	
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist	Leave area immediately, no debate
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

8.0 MEDICAL SURVEILLANCE PROCEDURES

All personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f) and, where applicable, expanded health standards.

8.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the SSO or PSD before a worker can enter the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PSD in consultation with the SSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance. In these cases, the employee will be taken to North Shore University Hospital at Glen Cove. The location and route to North Shore University Hospital at Glen Cove can be found in Appendix A.

9.0 DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal off site.

10.0 EMERGENCY RESPONSE / CONTINGENCY PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff are essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, and first aid for injuries incurred on-site, record keeping, and emergency site evacuation procedures. Emergency contact information, a list of key site personnel and hospital directions are included in this document in Appendix A.

10.1 Responsibilities

10.1.1 Site Safety Officer (SSO)

The SSO oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The SSO acts as a liaison to applicable regulatory agencies for safety-related issues and notifies OSHA of reportable accidents.

10.1.2 Project Manger (PM)

The PM is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The PM is responsible for performing head counts at the rall points after site evacuation. The PM is required to immediately notify the SSO and of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the SSO can notify OSHA within the required time frame. In addition, the Newport Project Manager will be notified verbally within 30 minutes of the incident.

10.1.3 Emergency Coordinator

The Site Safety Officer (SSO) is the primary Emergency Coordinator. In the event the SSO is not onsite or incapacitated, the Project Manager (PM) will act as the Emergency Coordinator.

In the event of an emergency, the Emergency Coordinator shall make contact with Local Emergency Response personnel. In these contacts, the Emergency Coordinator will inform response personnel about the nature of work on the Site, the type of contaminants and associated health or safety effects, and the nature of the emergency, particularly if it is related to exposure to contaminants.

The Emergency Coordinator shall review this plan and verify emergency phone numbers and identify hospital routes prior to beginning work on Site. The

Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator shall implement the Emergency Response/Contingency Plan whenever conditions at the Site warrant such action.

10.1.4 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a Site emergency.

10.2 Communications

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

The primary form of communication during an emergency between field groups in the exclusion zone and the Emergency Coordinator will be verbal communications. During an emergency situation, radio frequency communication lines will be kept clear so that all field teams can receive instructions.

10.2.1 Telephone/Radio Communications

A cellular telephone or landline telephone will be available on-site as well as 2-way radio.

10.2.2 Air Horns

Air horns will be used to alert Site personnel of emergencies. The following signals will be used:

- Two short blasts – shut down equipment, await instructions
- Three short blasts – site evacuation
- One continuous blast – injured employee, first-aid providers respond

10.2.3 Hand Signals

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 7.3.

10.3 Pre-Emergency Planning

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency.

In order to be able to deal with any emergency that might occur during remedial activities at the Site, emergency telephone numbers will be readily available in the PS vehicle. These telephone numbers are presented in the Site Specific Emergency Contact Information attached in Appendix A. Hospital route maps and MSDS sheets will also be readily available in a separate binder at the Construction Office.

10.4 Emergency Medical Treatment

The procedures and rules in this SSHASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it shall be reported to the PM immediately. The PM must inform the owner's representative immediately and the Project Manager within 30 minutes of the injury. First-aid equipment will be available on-site.

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that have been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, shall be followed closely.

10.5 Non-Emergency Medical Treatment

The procedures and rules in this SSHASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it shall be reported to the PM immediately. The PM must inform the owner's representative immediately. First-aid equipment will be available on-site.

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that have been set up. Injured personnel that do not require immediate emergency medical attention but require more care than can be provided by a first aid kit, will be directed to a walk in medical clinic located nearby the site. The name, location and directions of the Posillico approved walk in medical clinic are listed in Appendix A.

10.6 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs at the work area, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas. The rally point will be located directly across the street from the Site. Signs will be posted in the SSO and PM vehicles and in the decontamination trailer to indicate where the rally point is located.

If any task covered under this SSHASP has the potential for significant hazards, evacuation drills will be performed as deemed necessary by the PM, SSO and PSD. Additionally an evacuation drill will be performed prior to project startup and quarterly thereafter. Drills may be announced or unannounced.

10.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the work area. The Emergency Coordinator will then immediately notify the local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- No smoking in the exclusion zone or any work area.
- No hot work without a properly executed hot work permit.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.
- Fire extinguishers will be selected and positioned based on the potential type and size

of fire that could occur in accordance with OSHA Construction Standard 29 CFR 1910.157(d)(1), e.g. Class A – 75 feet from work area, Class B – 50 feet from work area.

- Monthly inspections of all fire extinguishers.

The person responsible for the maintenance of fire prevention and/or control equipment is the SSO. The person responsible for the control of fuel source hazards is the PS.

10.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) will be followed as necessary. If first aid or emergency medical treatment is necessary the Emergency Coordinator will contact the appropriate emergency facilities. A MSDS binder will be kept in the office trailer and in the Contamination Reduction Zone.

SKIN AND EYE CONTACT:	Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.
INHALATION:	Move to fresh air. Decontaminate and transport to hospital or local medical provider.
INGESTION:	Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

10.9 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or postponed. The PS, SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away carefully. If the outer contaminated garments cannot be safely removed on site, a plastic barrier between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

10.10 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site with regularly scheduled inspections.

- Industrial first aid kit (2-24 piece kits at a minimum)
- Portable eye washes
- Water gel burn kit
- Fire extinguishers
- Spill Kits
- Harness and lanyards
- Stretcher
- Direct reading instruments (DRI)
- Air Horn

10.11 Emergency Rescue Procedures

A site emergency is considered to be an event that has or threatens to have a detrimental physical impact on facilities, people, or the environment and requires immediate action. The definition applies to work locations and employees as well as the people and property associated with contractors and the community.

10.11.1 Responsibilities

- The PM (Christopher Hurst) is responsible for the overall conduct of the emergency procedures. This includes maintaining an orderly succession of supervision; making necessary reports to all concerned parties; ensuring that the incidents are identified and corrected; and ensuring the injured personnel(with or without life threatening injuries) are escorted to a medical treatment by the PM or other supervisory personnel.

- The SSO (Marc Atamian) has the responsibility for ensuring that the provisions of the SSHASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection procedures. The SSO is also responsible for conducting site inspections on a regular basis to ensure emergency readiness. The SSO shall be notified of any on-site emergencies and shall ensure that the appropriate procedures are followed.

10.11.2 First Aid

- First Aid Kits are located in company vehicles, and the decontamination facility.
- First Aid and CPR trained personnel shall be identified and on site at all times.
- Trained Emergency Responders (Site Specific) shall be identified and on site at all times.
- Emergency eye wash stations, emergency shower, and backboard shall be located at the decontamination facility.
- Monitoring Instruments shall be made readily available for real time monitoring of the atmosphere.
- Fire Extinguishers shall be made readily available. Minimum 10 pound ABC rating.

10.11.3 Procedure for Reporting Emergencies

- If your work is involved in an emergency situation STOP WORK IMMEDIATELY!
- Do not enter an area that is not safe to do so. Make call to the local emergency responders.
- Do not pick up anything that you did not drop yourself.
- Ensure the safety of the area and follow coworkers from any imminent danger.
- Report the emergency to your immediate supervisor by word of mouth or phone if at all possible.
- Supervisors and trained responders control hazards as necessary.
- Ensure that injuries are being cared for, assess the injury and seek assistance if necessary.

- Follow all decontamination procedures if injury and time allows.
- Secure the area and ensure that the area (scene) is not further disturbed.
- Position a point of contact at the gate to direct the Emergency responders to scene.
- Notify the LIRR Project Manager within 60 minutes of any emergency. Notification will be confirmed by direct contact, no voice mail. Where emergency measures exceed 60 minutes, the LIRR Project Manager shall be notified within 30 minutes of response needs being met.
- Provide a written report to the LIRR Project Manager within 24 hours.
- Any inquiries by the general public, news media or regulatory agencies will be referred to the LIRR Project Manager.

10.11.4 Personnel Injury

- The PS and or SSO shall ensure necessary first aid or medical attention is obtained. First aid shall be provided by qualified first aid providers or site Emergency Responders.
- For medical emergencies that are life threatening the appropriate community emergency services shall be notified and mobilized to the project site. The personnel within the EZ, regardless of level of PPE, will bring the injured person out of the EZ bypassing the decontamination procedures. The injured person will be ready at the CRZ for immediate evacuation by emergency personnel or local ambulance.
- For employees with less serious injuries, trained personnel are responsible for providing first aid care. In more severe cases, the field personnel at the scene will stabilize the injured person as much as possible with the EZ. Emergency response personnel will enter the EZ in appropriate PPE to conduct first aid and or remove the injured person for appropriate medical attention.
- If personnel are in need of medical evaluation, ensure that a safety officer or supervisor is assigned to escort the employee.

10.12 Accident/Incident Reporting

Incident reporting will be done following the guidelines established in the Incident Reporting Program in Section 4.0 of Posillico's Corporate HASP (Appendix E). Written confirmation of verbal reports shall be submitted within 24 hours.

In addition to the incident reporting procedures and actions described in the Corporate HASP, the PM will coordinate with the Engineer relative to reporting and notification for all environmental, safety, and other incidents. The Engineer will be notified within 60 minutes of any accident or incident (notification will be confirmed by direct contact, no voice mail). Furthermore, a written analysis will be generated and submitted within 24 hours of the accident or incident. If necessary, a site safety briefing will be held to discuss accidents/incidents and any findings from the investigation of the incident. The SSHASP will be modified if deemed necessary by the PSD and the SSO.

Additionally, near miss reporting will also be instituted on an as-needed basis. If a near miss occurs, a near-miss report will be completed. The results of the report will be discussed the following day during the morning safety huddle talk and during weekly project review meetings to prevent future near miss incidences from occurring.

10.13 Adverse Weather Conditions

In the event of adverse weather conditions, the PM, the SSO, and the Engineer will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The SSO and PM will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

10.14 Postings

The following information shall be posted or be readily visible and available at conspicuous locations throughout the site:

- Emergency telephone numbers
- Hospital Route Map
- OSHA Worker's Rights Posters

10.15 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers;
- Refilling medical supplies;
- Recharging eyewashes and/or showers;
- Replenishing spill control supplies; and
- Replacing used air horns.

10.16 Equipment Spill Requirements

Posillico will incorporate a Spill Response Kit to each site. The kit contains the proper supplies to effectively contain any petroleum release from any on-site heavy equipment (e.g. petroleum absorbent pads, Speedi-Dri, oil booms, etc.). In the event of a release, Posillico will utilize the supplies within the Spill Response Kit to contain the release and properly dispose of any saturated/contaminated cleanup materials within a 55-gallon drum or similar container. The container will then be properly disposed of. During the cleanup, Posillico site management will notify the Engineer of the spill and any pertinent details.

11.0 TRAINING

11.1 General Health and Safety Training

All Posillico site workers will be required to have received the 10 hour OSHA Construction Occupational Health and Safety training course. Supervisors will be required to have received the 30 hour OSHA Occupational Health and Safety training course.

11.2 Hazardous Waste Operations Training

In accordance with 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical). Proof of training shall be submitted to the SSO prior to the start of field activities.

11.3 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 29 CFR 1910.120 requirements and related company programs and procedures.

11.4 Supervisor Training

Personnel acting in a supervisory capacity shall have received 8 hours of instruction in addition to the initial 40 hours training.

11.5 Asbestos Awareness Training

Personnel capable of encountering asbestos-containing material (ACM) will receive an asbestos awareness training class prior to performing work on site.

11.6 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training (pre-work orientation) that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this SSHASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. Personnel that have not received site-specific training will not be allowed on-site.

11.7 Safety Meetings

For routine remediation tasks, a task-specific kick-off meeting to discuss safety issues will take place prior to starting fieldwork. This meeting will be held at an office location or occur in the field on the first day of work, depending on the complexity of issues to be discussed. Posillico will prepare and maintain documentation of these meetings.

Topics to be covered at these meetings will include:

- Safety plans and considerations for new job phases.
- Results of safety inspections.
- Review of accident history and the "Report of Accident/Incident" forms.
- Any applicable safety training.

Project personnel and visitors will be given both task-specific and general health and safety briefings daily by the SSO to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. A copy of the Daily Safety Huddle form is provided Appendix N. This form or an equivalent must be used to document that these safety briefings are being held. All workers and site visitors will be required to sign this form after each daily safety meeting to acknowledge their attendance and understanding of the material presented. In addition, once a week a Tool Box Talk will be given to review job specific safety topics in further depth.

11.8 First Aid and CPR

The PM and SSO will identify individuals requiring first aid and CPR training in order to ensure that emergency medical treatment is available during all work shifts. The training will be consistent with the requirements of the American Red Cross Association or equivalent and will include training on blood borne pathogens.

11.9 Respirator Protection Training

In all areas of the site where respiratory protection is required, employees will be required to have completed annual respiratory use and care training. It is also necessary for the employee to meet the medical and fit testing requirements.

11.10 Emergency Evacuation Training

Emergency evacuation training is required for all employees on site in order to inform them of the site emergency evacuation procedure. Employees must know the routes of egress, detailed in Appendix A, as well as the designated assembly area.

11.11 Hazard Communication

Hazard communication training will be provided in accordance with the requirements contained in the Health and Safety Hazard Communication Program in Appendix B. The SSO will conduct the training onsite as required to ensure all site personnel are aware or chemicals onsite.

11.12 Confined Space Training

Posillico will provide training for all personnel whose duties involve entry, support, or supervision for confined space entry.

11.13 Benzene Training

Posillico shall provide employees with information and training at the time of their initial assignment to a work area where benzene is present. If exposures are above the action level, employees shall be provided with information and training at least annually thereafter.

12.0 QUALITY ASSURANCE (LOGS, REPORTS, AND RECORD KEEPING)

The following is a summary of required health and safety logs, reports, and record keeping. Posillico will maintain all copies of all required health and safety logs, reports and records on site during field activities.

12.1 Medical and Training Records

Copies or verification of training (40 hour, 8 hour, 10 hour, supervisor, and site-specific training) and medical clearance for hazardous waste site work and respirator use will be maintained by the SSO and copies provided to the PM prior to the initiation of work on-site. All records will be kept by the SSO on-site.

12.2 On-Site Log

A log of personnel on-site each day including visitors will be kept by the PM in a logbook or as individual sheets maintained in a file.

12.3 Safety Inspection Logs

Safety inspections will be conducted weekly by the SSO in order to maintain safe working conditions (Appendix O). The inspections will serve as a tool in identifying hazards and compliance issues that will be addressed. All deficiencies will be addressed and corrected by the field supervision. Inspection logs will be maintained in the job trailer for the duration of the project. The SSO inspection will include, but not limited to, equipment, ladders, scaffolds, fire prevention and protection, harness and lanyards, spill kits, first aid kits, excavation and shoring, material handling and storage, and PPE.

12.4 Safety Equipment List and Log

A safety equipment list/log will be maintained on site by the SSO to ensure that adequate safety equipment is maintained on site at all times. Inspections of safety equipment, such as the eye wash station, first aid supplies, and fire extinguishers, will be conducted and recorded.

12.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets will be maintained by the PM during site work. At the end of the project they may be maintained in employee files if deemed necessary by the PM.

12.6 Accident/Incident Reports and Investigation

The incident reporting and investigation during site work will follow the Incident Reporting Program in Section 4.0 of the most recent edition of Posillico's Corporate HASP. Accident investigations will determine the cause of an accident so that a similar accident will not occur in the future. Posillico will determine the nature of the accident, record the findings and correct the cause.

Additionally, Posillico will actively participate in any Incident Analysis that may be required by Glen Cove IDA. Posillico will also make any subcontractor aware of this issue and they will be obligated to participate as well.

12.7 Hazard Communication Program

Material Safety Data Sheets (MSDSs) will be obtained for applicable substances and included in a separate MSDS binder. The hazard communication program will be maintained on-site in accordance with 29 CFR 1910.1200 and the Hazard Communication Program in Appendix B.

12.8 Safety Disciplinary Policy

Posillico Environmental believes that a safety and health Accident Prevention Program is unenforceable without some type of disciplinary policy. Our company believes that in order to maintain a safe and healthful workplace, the employees must be cognizant and aware of all company, State, and Federal safety and health regulations as they apply to the specific job duties required. The following disciplinary policy is in effect for Posillico employees and will be applied to all safety and health violations.

The following steps will be followed unless the seriousness of the violation would dictate going directly to Step 2 or Step 3.

1. A first time violation will be discussed orally between company supervision and the employee. This will be done as soon as possible.

2. A second time offense will be followed up in written form and a copy of this written documentation will be entered into the employee's personnel folder.

3. A third time violation will result in time off or possible termination, depending on the seriousness of the violation.

12.9 Work Permits

All work permits, including confined space entry, hot work, lockout/tagout permits will be maintained in the project files. Copies of all work permits shall also be provided to the Engineer.

12.10 Quality Assurance Process

Posillico will maintain a Quality assurance program for the duration of the project in order to ensure that the above noted forms and controls are being properly implemented and utilized. The quality assurance process will include the following:

- The SSO will discuss instances of non-compliance with the non-compliant party and the issue will be resolved within 24 hours;

- When the issue becomes resolved, proper documentation will be taken in order to prove that the issue has been closed out;

- The SSO will review the daily inspection forms weekly and for accurateness and to ensure that the issues have been resolved and closed out properly. Additionally, the SSO will review any related forms or permits (confined space, hot work, injury reports, MSDSs, chemical lists etc.) for accurateness. Delinquent items will be addressed as necessary; and

- The SSO will perform a weekly visual inspection of the site and including any areas/issues of non-compliance noted by the SR throughout the week.

- The PSD will perform periodic site safety audits to ensure all safety policies and procedures described in this SSHASP and in the most recent edition of the Posillico Corporate HASP are being followed.

13.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of this SSHASP for the site. It is maintained on-site by the PS as a project record. Each field team member shall sign this section after training in the contents of this SSHASP has been completed.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I have also completed site-specific training for the work detailed in the project Work Plan. I will comply with the provisions contained therein.

NAME (PRINT AND SIGN)		EMPLOYEER	DATE

APPENDIX A

SITE-SPECIFIC EMERGENCY INFORMATION

EMERGENCY INFORMATION

The appropriate telephone numbers are listed below for medical emergencies.

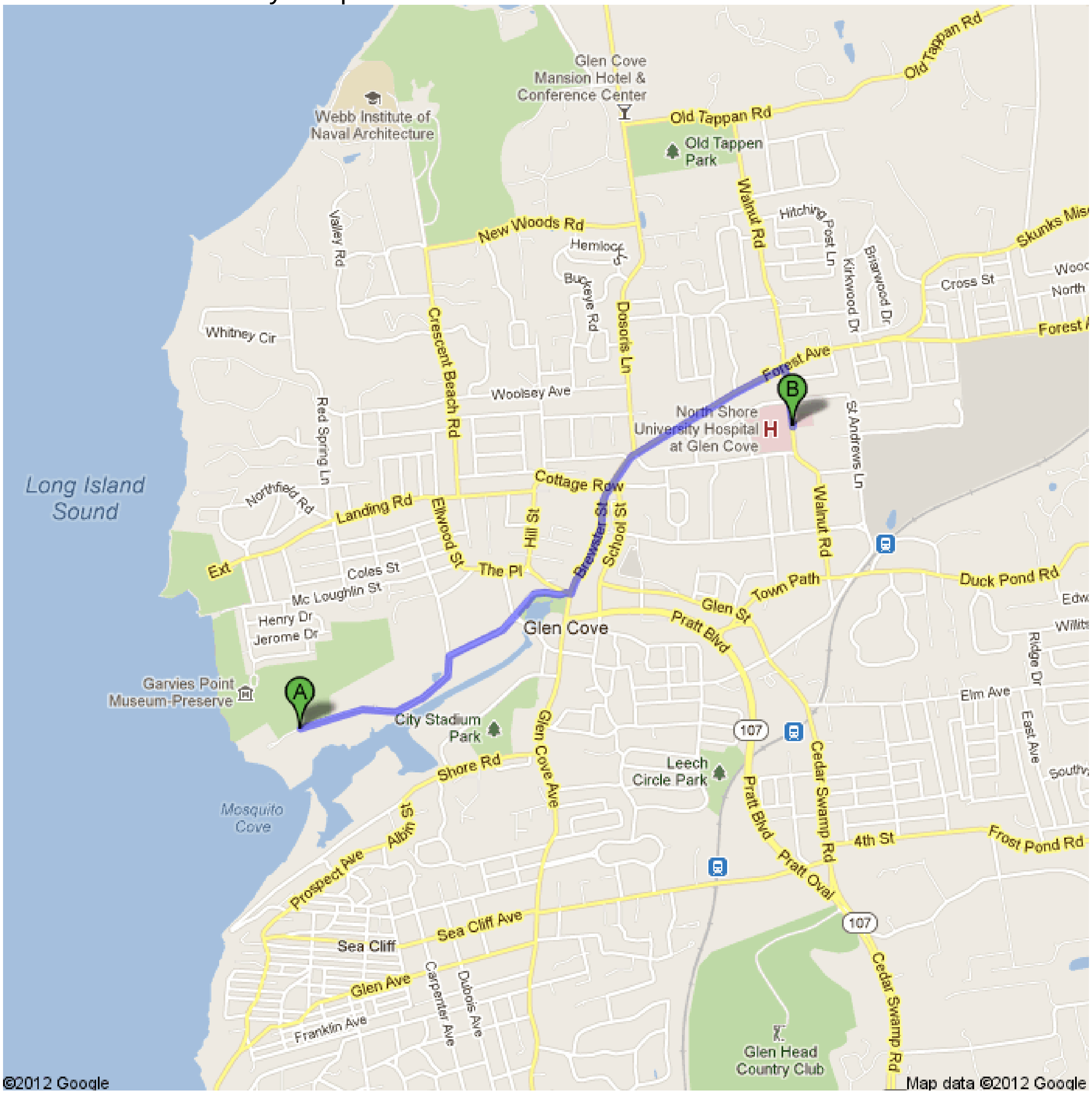
ANY SERIOUS EMERGENCY - DIAL 911

Nearest Hospital to: 10 Garvies Point Road
North Shore University Hospital at Glen Cove
101 St. Andrews Lane
Glen Cove, NY 11542
(516) 674-7300

Other Emergency Numbers

Agency	Contact	Phone Number
Police Emergency		911
Fire Emergency		911
Rescue Squad		911
New York Poison Control		(800) 222-1222
Center for Disease Control		(800) 311-3435
D&B Project Manager		
D&B Field Manager		
Construction Contract Administrator	Erin Reilley	(516) 676-1625 x 107
Posillico EHS Director	Paul McKinney	(516) 807-8077
Posillico Project Manager	Christopher Hurst	(516) 523-0295
Posillico Area Manager	Michael Perciballi	(516) 523-3945
Posillico Foreman	Michael Rosato	(516) 903-6626
Posillico Site Safety Officer/ Environmental Engineer	Marc Atamian	(516) 807-8016

North Shore University Hospital at Glen Cove



1. Head **northeast** on **Garvies Point Rd** toward **Charles St** go 0.5 mi
Total 0.5 mi

2. Take the 1st right onto **Charles St/Herb Hill Rd** - Continue to follow Herb Hill Rd go 0.4 mi
Total 1.0 mi

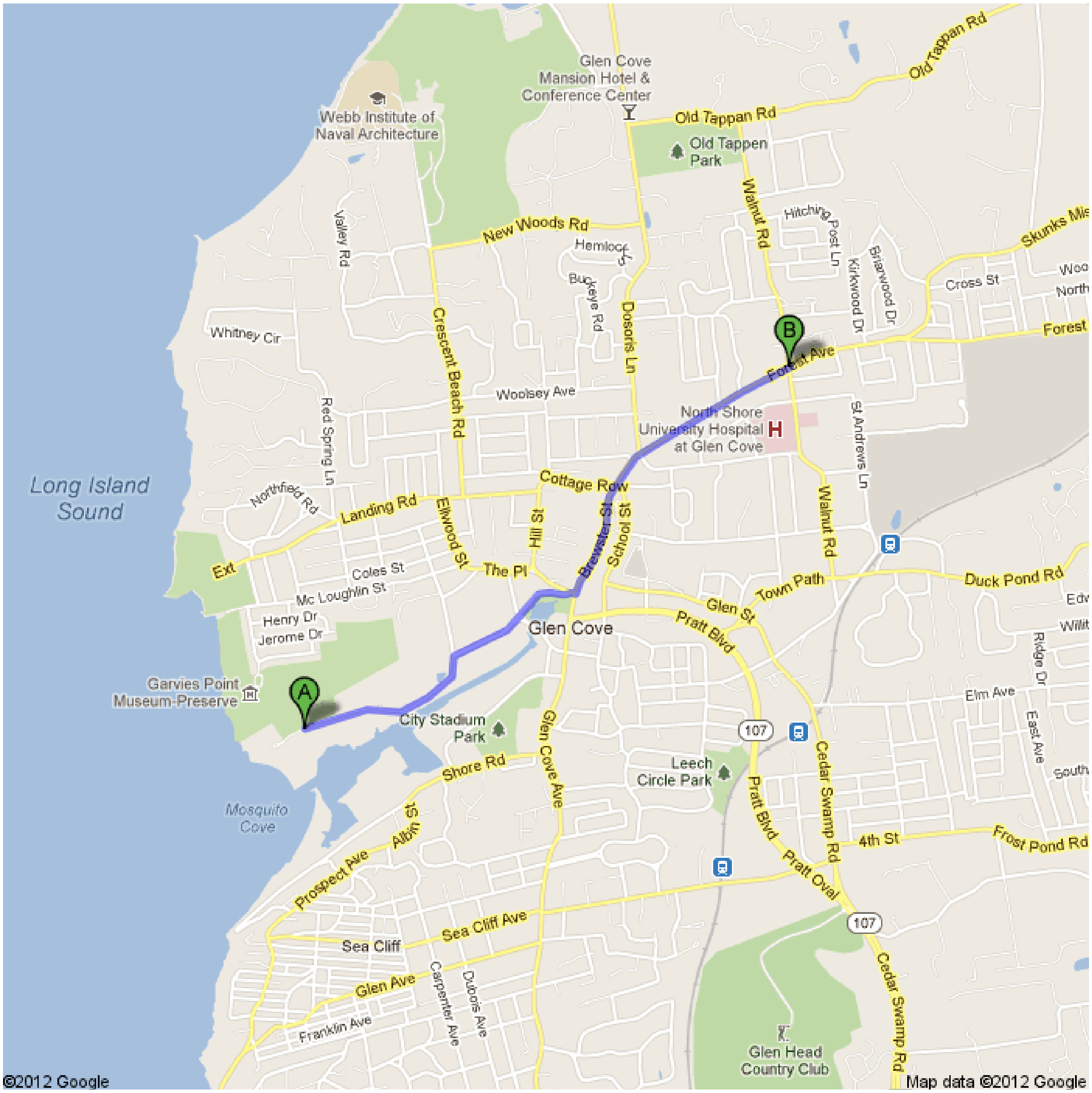
3. Turn left onto **Brewster St** go 0.3 mi
Total 1.3 mi

4. Continue onto **Forest Ave/School St** - Continue to follow Forest Ave go 0.6 mi
Total 1.9 mi

5. Turn right onto **Walnut Rd** - Destination will be on the right go 0.2 mi
Total 2.1 mi

North Shore University Hospital at Glen Cove
North Shore University Hospital at Glen Cove, 101 Saint Andrews Ln, Glen Cove, NY 11542 - (516) 674-7300

Glen Cove Med Station – First Aid Treatment



1. Head **northeast** on **Garvies Point Rd** toward **Charles St** go 0.5 mi
Total 0.5 mi

2. Take the 1st right onto **Charles St/Herb Hill Rd** - Continue to follow Herb Hill Rd go 0.4 mi
Total 1.0 mi

3. Turn left onto **Brewster St** go 0.3 mi
Total 1.3 mi

4. Continue onto **Forest Ave/School St** Continue to follow Forest Ave Destination will be on the right go 0.6 mi
Total 1.9 mi

Glen Cove Medical Center - 104 Forest Ave, Glen Cove, NY 11542
(516) 759-5406

APPENDIX B

HAZARD COMMUNICATION PROGRAM

Posillico Hazard Communication Program

Introduction

The intent of the Hazard Communication Program is to provide employees with information about the potential health hazards from exposure to workplace chemicals in accordance with the OSHA Hazard Communication Standard promulgated on August 24, 1987. In order to accomplish its goal of transmitting this information to its employees, a written hazard communication program specifying how this goal will be achieved has been formulated. This document represents Posillico's Hazard Communication Program (HCP).

Employee participation is the key ingredient to the HCP. It is extremely important that employees not only follow the procedures, but also understand the reasoning. The Hazard Communication Program is an integral part of Posillico's effort to provide its employees with a healthy and safe workplace.

Although most Posillico field projects do not involve the use of hazardous substances it is imperative that all hazardous materials be managed in accordance with this program. This applies to any usage of hazardous materials regardless of volume. Each Office must maintain a copy of this program and review it with affected employees.

Purpose

To make information available to employees concerning chemical hazards known to be present in the workplace (i.e., Posillico facilities or client locations) under normal conditions, or in a foreseeable emergency.

Scope

This Hazard Communication Program (HCP) applies to any chemical obtained in excess of retail amounts known to be present in the workplace that employees may be exposed to under normal conditions of use, or may be exposed to in a foreseeable emergency. The HCP describes procedures for: determining chemical hazards in Posillico operations; providing training on chemical hazards to employees; and transmitting chemical hazard information through proper labeling and Material Safety Data Sheets (MSDSs). A master compilation of MSDSs is maintained at the Posillico Headquarters and copies of applicable MSDSs are maintained at each office. Field staff are responsible for keeping MSDSs for work performed at each job site. This inventory list is used to conduct annual inventory checks of Posillico’s stored chemicals.

Responsibilities

The following individuals and groups are responsible for implementing the Hazard Communication Program (HCP).

1. Health and Safety Assessment Division

    a. Provide general training to all new and existing employees as appropriate under the HCP. This training will include hazardous material monitoring and recognition, emergency response and understanding labels.

    b. Maintain documentation for HCP training, inform division/section managers of annual training requirements.

    c. Periodically update and review Hazard Communication Program.

    d. Maintain file of current MSDSs and arrange for retention of all obsolete MSDSs.

    e. Review operations with division/section managers to determine what jobs require HCP training.

    f. Obtain all missing MSDSs.

    g. Audit job sites and work areas for compliance with the HCP.

    h. Annually audit chemical listing to ensure that the most current MSDSs are on file and maintain a complete chemical inventory of chemicals in use.

    i. Act as liaison to outside authorities responding to chemical emergencies or conducting inspections to verify compliance with the HCP.

2. Department/Section Manager

    a. Inventory and compile listing of chemicals used in Department/Section annually and each job site.

    b. Provide specific training as appropriate for Department/Section/Client location.

    c. Notify H&S Division of any changes in operations that could affect the way hazardous chemicals are handled.

    d. Identify all jobs requiring the use or handling of hazardous chemicals.

    e. Notify H&S Division of employees requiring hazard specific training.

    f. Notify H&S Division when new hazards are presented.

    g. Ensure proper labeling procedures and MSDS review is being followed.

3. Employee

   a. Follow HCP procedures.

   b. Use PPE as instructed by training procedures.

   c. Inform division/section manager or H&S Division of:

      - Any symptoms of overexposure that may be related to handling hazardous chemicals.
      - Missing or inappropriate labels.
      - Missing or unavailable MSDSs.
      - Malfunctioning or unavailable safety equipment.
      - Read, understand and comply with information on labels and MSDSs.
      - Leave labels affixed to containers.
      - Use only approved containers for hazardous chemicals.
      - Know the location of emergency equipment on site and in the facility (if applicable).
      - Know your role in contingency plans.
      - Understand all changes in chemical handling and procedures.
      - Attend training sessions as scheduled.

4. Purchasing Department

   a. Request Material Safety Data Sheets (MSDS) from suppliers on each order of a chemical subject to this Program.

   b. Document the request for an MSDS on the purchase order.

Training

1. General Training: Training on this program will be part of Posillico's annual refresher training or supplied on an as-needed basis.

   General training will consist of the following items:

   a. Requirement of OSHA HCS (29 CFR 1910.1200)

   b. Details of Posillico's HCP including:
      - Labeling
      - MSDSs
      - How employees can obtain and use appropriate hazard information.

   c. Detailed explanation on how to read and interpret an MSDS including:
      - Description
      - Sections
      - Explanations of each section
      - Usefulness of each section
      - Applicability of each section

2. Specific Training

   a. Listing of hazardous materials in each department/location/site.

   b. Location of MSDSs in each department/site.

   c. Written hazard evaluation procedures as referenced in Attachment A – Posillico Hazardous Chemical Label.

   d. Methods and observations to detect hazardous materials in the workplace, including:
      - Exposure monitoring
      - Continuous monitoring
      - Visual inspection
      - Odor
      - Other physical or unusual appearances

   e. Physical and health hazards of chemicals present in the workplace.

   f. Protection measures and procedures:

      - Appropriate work practices
      - Emergency procedures
      - PPE

   g. Field operations where hazardous chemicals are present.

<u>Non-routine Tasks</u>

Posillico typically uses low quantities of hazardous materials on job sites and in the laboratory. Posillico projects that involve large quantities of hazardous materials, extremely hazardous substances or exposure to a client’s hazardous materials that are not on Posillico’s inventory are to be reviewed on a case by case basis to determine the necessary training to safely work with these materials. Clients regulated under the Process Safety Management program require affected Posillico employees to attend the Client’s site specific safety training program before being allowed access to the site. The Posillico Safety Department will provide training to employees when client training is not provided. All training will be documented and repeated as necessary. For example, Posillico does provide task specific training to DOT regulated employees for General Awareness, Shipping and Driving for workers involved in the shipping of hazardous materials and this training is provided every three years. Project Managers will notify the Safety Department when conducting non-routine tasks or when working with extremely hazardous substances in order to properly train employees before the project commences.

Training, Documentation

1. Record names of attendee(s).
2. Request that employees initial by their names.
3. Complete training documentation form.
4. Submit copies to H&S Coordinator for employee training file.

Material Safety Data Sheets (MSDSS)

1. MSDS Requirements

    a. An MSDS must be available for each hazardous material used in the workplace. A master compilation of MSDSs is maintained at the Posillico Headquarters and copies of applicable MSDSs are maintained at each site. Field staff is responsible for keeping MSDSs for work performed at each job site. Copies of MSDSs can be obtained by contacting the Safety Department. MSDSs for each office should be located near the area where hazardous materials are stored.

    b. The H&S Assessment Division will ensure that all MSDSs are complete, legible and in English. Employees that cannot read or understand English will be provided training as needed in a manner that the employee can understand.

    c. A file containing appropriate MSDSs for each Posillico facility will be readily available to all employees.

    d. A cover sheet will identify all MSDSs in the file – Attachment B.

    e. The H&S Assessment Division will audit the file.

    f. The Facility Manager will keep a master list of chemicals by department and listed alphabetically, by division.

    g. The H&S Assessment Division will distribute, to each department, new or updated MSDSs as they become available and make changes in the master list.

    h. Old MSDSs will remain on file permanently.

    i. MSDSs must be capable of being cross-referenced to their container labels, where appropriate.

    j. Where a process or group of hazardous chemicals presents a health hazard greater than or not indicated by the individual MSDSs, written operating procedures will also be provided or readily accessible. Standard operating procedures by the manufacturer, job descriptions, etc. may be useful for this information.

2. Procedure for Obtaining MSDSs

    a. The Purchasing Department will make an initial request for an MSDS from the manufacturer, either by phone, facsimile or mail. A copy of the request will be maintained with the name of the individual contacted and the date and included in the purchase order.

    b. Employees who are working at a manufacturing location should request a MSDS from the site contact for both raw materials and finished product.

    c. If MSDSs are not received within a reasonable time, approximately 30 days, the H&S Assessment Division or Facility Manager will send a second request to the manufacturer via certified mail, with a return receipt requested.

d. If, after the second request, no MSDS is sent, the H&S Assessment Division will contact the appropriate local OSHA area office by telephone, informing them of Posillico's inability to obtain an MSDS from the manufacturer.

e. The H&S Assessment Division will document the following information: date; name; title of OSHA contact; and, summary of conversation.

f. A copy of this information will be placed in the master file with the H&S Division for a 30-day period.

g. If the MSDS is not received or OSHA does not contact the H&S Assessment Division within 30 days, H&S Assessment Division will contact the local OSHA area office again.

h. If the MSDS is not received within 60 days, the H&S Assessment Division will contact the regional OSHA office.

3. Labeling

a. All manufacturers' labels will be left on containers.

b. All container labels will be legible, prominently displayed, and in English as well as any other prevalent language. Posillico will provide interpretation to employees who do not read or understand English when necessary.

c. Minimum label contents include chemical identity; appropriate hazard warnings; and the name and address of the manufacturer.

d. All labels must contain the information described in Attachment A. Posillico has generated a label for use when portable containers are poured off from the original container to a compatible unlabeled container for field, laboratory or facility use. This label should also be used for samples and mixtures suspected of containing hazardous materials. The appropriate MSDS will be referenced in order to complete the "Hazard Warning" portion of the label and determine if the chemical is compatible with the container in which it is being stored.

e. Posillico uses the International Air Transport Association/Department of Transportation Hazard Classification System for labeling hazardous material shipments by Posillico. Each office that ships hazardous materials must obtain appropriate labels for the shipment and transport of hazardous materials. Copies of the labels for the nine classes of hazardous materials are included in Attachment A.

4. Outside Contractors

a. Unless required by the nature of services to be provided, Posillico will attempt to restrict contractors from contact with hazardous chemicals on Posillico property or projects.

b. The Office Manager will notify the H&S Coordinator of all outside contractors on Posillico property or subcontracted to perform on Posillico projects.

c. The Project Manager will review the work and determine all hazardous chemicals to which the outside contractor's employees may be exposed.

d. The Project Manager will provide to the contractor a list of hazardous chemicals to which their employees may be exposed, and copies of corresponding MSDSs.

e. The Project Manager will inform the contractor of precautionary measures contained within the MSDS.

f. The Project Manager will inform the contractor of the labeling system used in the location of the contractor's work.

g. Records will be retained permanently with the H&S Coordinator.

5. References:

29 CFR 1910.1200, Hazard Communication.

OSHA Instruction CPL 2-2.38A, CH-1, July 18, 1986.

ACGIH, Threshold Limit Values and Biological Exposure Indices for 2004.

International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans,* Supplement 7, pgs. 31-32, 41-46.

U.S. Department of Health and Human Services, Fifth Annual *Report on Carcinogens, Public Health Service, National Toxicology Program,* 1989.

Genium Publishing Corporation, MSDS Pocket Dictionary, August, 1988.

National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, June, 2002.

United States Department of Agriculture, Hazard Communication: A Program Guide for Federal Agencies; August, 1987.

ATTACHMENT A

POSILLICO HAZARDOUS CHEMICAL LABEL

HAZARDOUS CHEMICAL

IDENTITY: ____

HAZARD WARNING: ____

____

MANUFACTURER:

ADDRESS: City ____________________ State ____________________

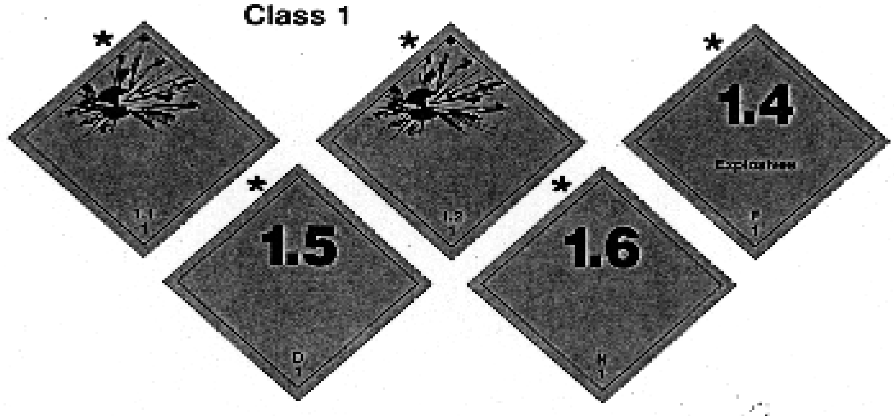
TELEPHONE: ____________________________

IATA/ICAO HAZARD AND HANDLING LABELS

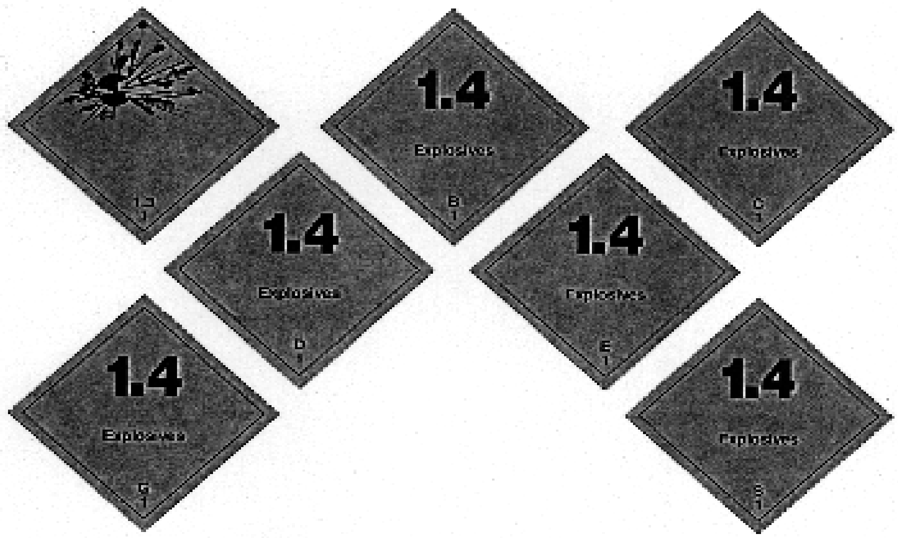
Except for Radioactive and Handling Labels, text indicating the nature of risk on label is optional.

Primary hazard labels

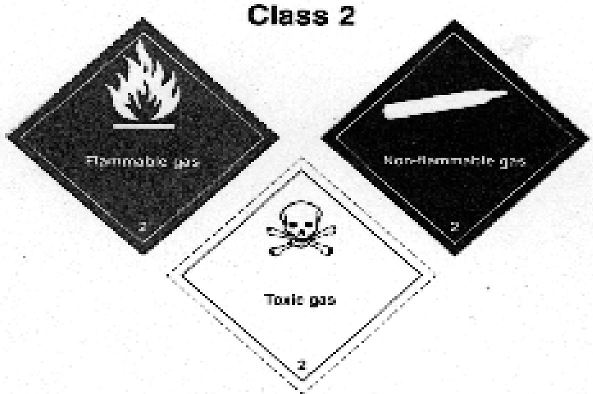
Class 1



* Articles bearing the Explosive labels shown above and falling into Divisions 1.1, 1.2, 1.4F, 1.5 and 1.6 are normally forbidden.



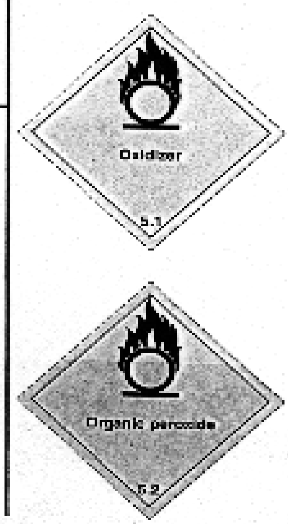
Class 2



Class 3

Class 4

Class 5

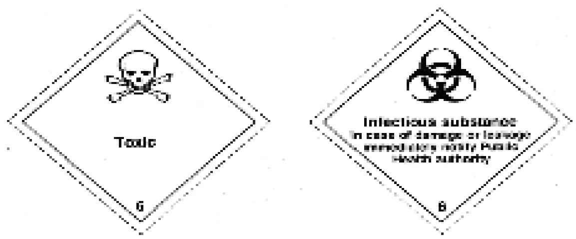


IATA/ICAO HAZARD AND HANDLING LABELS (CONT.)

Except for Radioactive and Handling Labels, text indicating the nature of risk on label is optional.

Primary hazard labels (cont.)

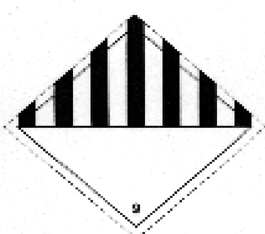
Class 6



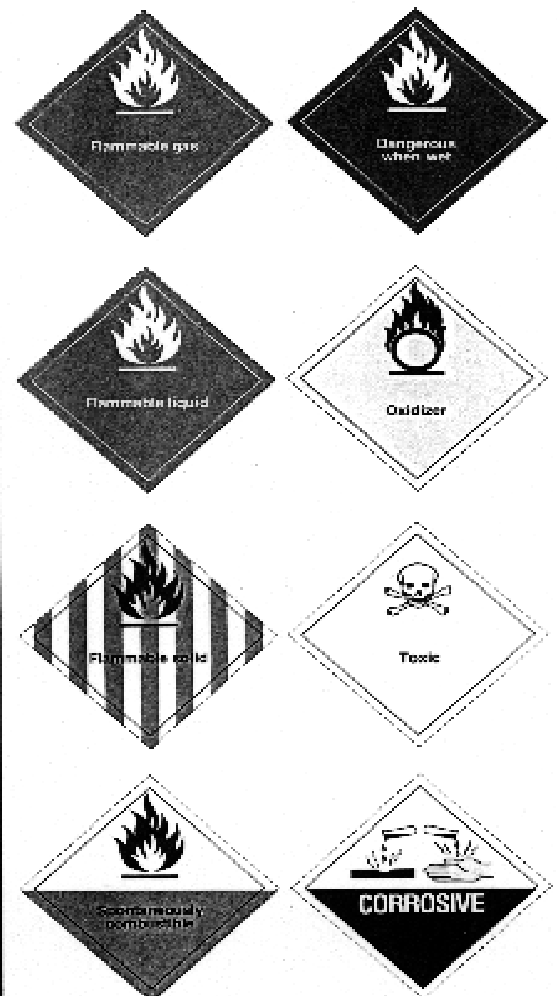
Class 7

Class 8

Class 9



Secondary hazard labels



Handling labels

APPENDIX C

Cold Stress

Posillico
STANDARD PRACTICE INSTRUCTION

SUBJECT

Cold Stress

1. *Purpose and Introduction*

The purpose of this document is to educate the employee about exposure to cold environments and the effects of hypothermia and other cold-related injuries. Through proper use of Personal Protective Equipment (PPE), engineering and administrative controls; and education, cold injury, both to the extremities and the body's core temperature can be prevented.

2. *Scope*

This program is intended for use by employees engaged in work with the potential for exposure to cold environments. This program will be reviewed annually by the Health and Safety Department. Training will be provided annually to all those potentially affected, and will include this written program.

3. *Working in Cold Environments*

Metabolic Responses

The human body is designed to function best at a rectal temperature of 99-100F. The body maintains this temperature in two ways: by gaining heat from food and muscular work; or, by losing it through radiation and sweating. By constricting blood vessels of the skin and/or shivering, the body uses its first line of cold defense.

Temperature control of the body is better understood by dividing the body into two main parts: the shell; and, the core. The shell is comprised of the skin, capillaries, nerves, muscles and fat. Other internal organs such as the heart, lungs, brain and kidneys make up the core.

During exposure to cold, the skin is first affected. Blood in the peripheral capillaries is cooled, sending a signal to a portion of the brain called the hypothalamus. Regulating body temperature is one of the many basic body functions of the hypothalamus. Acting like a thermostat, adjustments are performed in order to maintain normal body temperatures. When a chill signal is received, two processes are begun by the hypothalamus: conserve heat already in the body; and, generate new heat.

Heat conservation is performed through constriction of the blood vessels in the skin (shell), thus reducing heat loss from the shell and acting as an insulator for the core. Sweat glands are also inhibited, thus preventing heat loss by evaporation.

Additional fuel for the body is provided in the form of glucose. Glucose causes the heart to beat faster, sending oxygen and glucose-rich blood to the tissue where needed. In an attempt to produce heat, the muscles rapidly contract. This process is better known as "shivering", and generates heat similarly to that created by strenuous activity, raising the body's metabolic rate.

During physical activity and fatigue, the body is more prone to heat loss. As exhaustion approaches, blood vessels can suddenly enlarge, resulting in rapid loss of heat. Exposure to extreme cold causes nerve pulses to be slowed, resulting in fumbling, sluggish and clumsy reactions.

4. *Cold Injuries*

Cold injuries are classified into two categories: local; or, general. Local injuries include frostbite, frostnip, chilblain and trenchfoot. General injuries include hypothermia and blood vessel abnormalities (genetically or chemically induced). Major factors contributing to cold injury are exposure to humidity and high winds; contact with wetness or metal; inadequate clothing; age; and, general health. Allergies, vascular disease, excessive smoking and/or drinking, and certain drugs and medicines are physical conditions that can compound the effects of exposure to a cold environment.

a. Hypothermia

Hypothermia is a condition of reduced body temperature. Most cases develop in air temperatures between 30-50°F, not taking windchill factor in consideration.

Symptoms of hypothermia are uncontrolled shivering and the sensation of cold. The heartbeat slows and sometimes becomes irregular, weakening the pulse and changing blood pressure. Changes in the body chemistry cause severe shaking or rigid muscles; vague or slow slurred speech; memory lapses; incoherence; and, drowsiness. Cool skin, slow irregular breathing, low blood pressure, apparent exhaustion, and fatigue after rest can be seen before complete collapse.

As the core temperature drops, the victim can become listless, confused, and make little or no effort to keep warm. Pain in the extremities can be the first warning of dangerous exposure to cold. Severe shivering must be taken as a sign of danger. At a core body temperature of about 85°F, serious problems develop due to significant drops in blood pressure, pulse rate and respiration. In some cases, the victim may die.

Sedative drugs and alcohol increase the risk of hypothermia. Sedative drugs interfere with the transmission of impulses to the brain. Alcohol dilates blood vessels near the skin's surface, increasing heat loss and lowering body temperature.

Table I, in Attachement A, provides information on the onset of hypothermia and metabolic responses at different body temperatures.

b. Raynaud's Phenomenon

Raynaud's Phenomenon is the abnormal constriction of the blood vessels of the fingers on exposure to cold temperatures, resulting in blanching of the ends of the fingers. Numbness, itching, tingling or a burning sensation may occur during related attacks. The disease is also associated with the use of vibrating hand tools in a condition sometimes called White Finger Disease. Persistent cold sensitivity, ulceration and amputations can occur in severe cases.

c. Acrocyanosis

Acrocyanosis is caused by exposure to the cold and reduces the level of hemoglobin in the blood, resulting in a slightly blue, purple or gray coloring of the hands and/or feet.

d. Thromboangitis Obliterans

Thromboangitis obliterans is clotting of the arteries due to inflammation and fibrosis of connective tissue surrounding medium-sized arteries and veins. This is one of the many disabling diseases that can also result from tobacco use. Gangrene of the affected limb often requires amputation.

e. Frostbite

Frostbite is the freezing of the body tissues due to exposure to extremely low temperatures, resulting in damage to and loss of tissue. Frostbite occurs because of inadequate circulation and/or insulation, resulting in freezing of fluids around the cells of the body tissues. Most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Frostbite can affect outer layers of skin or can include the tissues beneath. Damage can be serious, with permanent loss of movement in the affected parts, scarring, necrotic tissue, and amputation are all possibilities. Skin and nails that slough off can grow back.

The freezing point of the skin is about 30°F. As wind velocity increases, heat loss is greater and frostbite will set in more rapidly.

There are three (3) degrees of frostbite: first degree, freezing without blistering and peeling; second degree, freezing with blistering and peeling; and, third degree, freezing with death of skin tissues and possibly the deeper tissues.

The following are symptoms of frostbite:

i. Skin changes color to white or grayish-yellow, progresses to reddish-violet, and finally turns black as the tissue dies;

ii. Pain may be felt at first, but subsides;

iii. Blisters may appear;

iv. Affected part is cold and numb.

The first symptom of frostbite is usually an uncomfortable sensation of coldness followed by numbness. Tingling, stinging, cramping and aching feelings will be experienced by the victim. Frostbite of the outer layer of the skin has a waxy or whitish look and is firm to the touch. Cases of deep frostbite cause severe injury. The tissues are cold, pale and solid. The victim is often unaware of the frostbite until someone else observes these symptoms. It is therefore important to use the "buddy system" when working in cold environments, so that any symptoms of overexposure can be noted.

Table II, in Attachement A, describes the cooling power of wind on exposed flesh. This information can be used as a guide for determining equivalent chill temperatures when the wind is present in cold environments.

f. Trench Foot and Chilblains

Trench foot is swelling of the foot caused by long, continuous exposure to cold without freezing, combined with persistent dampness or immersion in water. Edema (swelling), tingling, itching and severe pain occurs, followed by blistering, necrotic tissue and ulcerations. Chilblains have similar symptoms as trench foot, except that other areas of the body are affected.

g. Frostnip

Frostnip occurs when the face or extremities are exposed to a cold wind, causing the skin to turn white.

5. Prevention of Cold Stress

Cold Stress can be prevented through a combination of various factors: acclimation; water and salt displacement; medical screening, proper clothing selection; and, training and education. Through the use of engineering controls, work practices, work/rest schedules, environmental monitoring and consideration of the windchill temperature, the employee can be protected.

a. Acclimation

Acclimation can be achieved to some degree. Sufficient exposure to cold causes the body to undergo changes to increase comfort and reduce the risk of injury. But, these changes are minor and require repeated exposure to cold and uncomfortable temperatures to induce them.

b. Dehydration

The dryness of cold air causes the body to lose a significant amount of water through the skin and lungs. It is essential that caffeine-free, non-alcoholic beverages be available at the worksite for fluid replacement. Dehydration also increases the risk of injury due to cold and affects blood flow to the extremities.

c. Diet

A well-balanced diet is important for employees working in cold environments. Diets restricted only to certain foods may not provide the necessary elements for the body to withstand cold stress, leaving the worker vulnerable.

d. Control Measures

When the wind-chill factor results in an equivalent temperature of -26F, continuous exposure of the skin will not be permitted. Any worker exposed to temperatures of 36F or less who becomes immersed in water will be given dry clothing immediately and treated for hypothermia at the local hospital if any symptoms of hypothermia are present. Notification of this incident will be provided to the Health and Safety Division immediately after sending the worker to the hospital.

e. Engineering Controls

The following are some ways that environmental controls can be used to reduce the effects of a cold environment:

i. General or spot heating should be used to increase temperature in certain areas in the workplace;

ii. Warm air jets, radiant heaters or contact warm plates can be used to warm the worker's hands if fine work is to be performed with bare hands for 10 to 20 minutes or more;

iii. Shield the work area if air velocity at the work site is increased by wind, draft or ventilating equipment;

iv. Metal handles of tools and control bars should be covered with thermal insulating material at temperatures below 30°F;

v. Unprotected metal chair seats will not be used in cold environments;

vi. When appropriate and feasible, equipment and processes will be substituted, isolated, relocated, or redesigned;

vii. Power tools, hoists, cranes or lifting aids will be used to reduce the metabolic workload;

viii. Heated warming shelters will be made available for continuous work being performed in an equivalent temperature of 20F or below. Workers will be encouraged to use the shelters regularly.

f. Administrative Work Practice Controls

Work practices and guidelines can be designed and developed to reduce exposure to cold stress. Some of these may include:

i. Work-rest schedules to reduce the peak of cold stress;

ii. Enforce scheduled breaks;

iii. Enforce intake of caffeine-free, non-alcoholic beverages;

iv. Schedule work that has potential exposure to cold stress for the warmest part of the day;

v. Move work to warmer areas, whenever possible;

vi. Assign extra workers for high-demand tasks;

vii. Provide relief workers for other workers needing breaks;

viii. Teach basic principles of recognizing and preventing cold stress;

ix. Use the buddy system for work at 10°F or below, and keep within eyeshot;

x. Allow new employees to adjust to the conditions before they work full-time in cold environments;

xi. Minimize sitting and standing in one place for long periods of time;

xii. Include weight and bulkiness of clothing when estimating work performance requirements and weights to be lifted.

Table III, in Attachment A, provides a work/warm-up schedule for cold environments, with wind chill taken into account.

g. Special Considerations

Older workers and workers with circulatory problems should be extra careful in cold environments. Sufficient sleep and good nutrition are important preventive measures for maintenance tolerance to the cold. Double shifts and overtime work should be avoided when working in cold environments.

If any of the following symptoms are observed on site, the affected worker will immediately go to warm shelter:

- Onset of heavy shivering;
- Frostnip;
- Feeling of excessive fatigue;
- Drowsiness;
- Euphoria.

After entering the warm shelter, the outer layer of clothing should be removed. If the clothing is wet from sweat and perspiration, dry clothing should be provided. If this is not feasible, then the clothing should be loosened to allow sweat to evaporate.

Anyone working in cold environments and on prescribed medication should consult their physician concerning any possible side effects due to cold stress. Those individuals suffering from diseases and/or taking medication that interferes with normal body temperature regulation or reduces the tolerance to cold will not be allowed to work in temperatures of 30F or below.

6. First Aid Measures for Cold Stress Exposure

a. Call for emergency help. (i.e., Ambulance or Call 911)

b. Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.

c. Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.

d. Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. DO NOT rub the person's body or place them in a warm water bath. This may stop their heart.

7. Personal Protective Equipment (PPE)

In choosing PPE for cold environments, it is important to maintain airspace between the body and outer layer of clothing to retain body heat. The more air pockets, the better the insulation. The clothing should also allow for the evaporation of sweat if the skin is wet.

The most important parts of the body to protect are the feet, hands, head and face. Hands and feet become cooled most easily, because of their distance from the heart. Keeping the head covered is equally important. As much as 40% of body heat loss is through the head when it is exposed.

Ideal clothing for exposure to cold environments is made of cotton. Cotton picks up sweat off the body and brings it to the surface. Loosely fitted clothing also aids in sweat evaporation. Recommended clothing may include the following:

a. Polypropylene under shirt and shorts under thermal underwear (preferably two-piece);
b. Wool socks;
c. Wool or thermal pants, lapped over boot tops to keep out snow and water;
d. Suspenders (belts can constrict and reduce circulation);
e. Insulated work boots, preferably waterproof. Safety toe, if necessary;
f. Wool or cotton shirt;
g. Parka;
h. Knit cap/hard hat liner;
i. Wool mittens or gloves (depending on the dexterity required);
j. Face mask or scarf.

Dirty or greasy clothing loses much of its insulation value. Dirty clothing crushes air pockets, allowing air to escape more easily. Also, denim is not a good protective fabric. It is loosely woven and allows water to penetrate and wind to blow away body heat.

TABLE I
Progressive Clinical Presentation of Hypothermia*

Core Temperature Deg. C	Deg. F	Clinical Signs
37.6	99.6	"Normal" rectal temperature.
37	98.6	"Normal" oral temperature.
36	96.8	Metabolic rate increases in an attempt to compensate for heat loss.
35	95.0	Maximum shivering.
34	93.2	Victim conscious and responsive, with normal blood pressure.
33	91.4	Severe hypothermia below this temperature.
32	89.6	Consciousness clouded; blood pressure becomes difficult to obtain;
31	87.8	pupils dilated but react to light; shivering ceases.
30	86.0	Progressive loss of consciousness; muscular rigidity increases;
29	84.2	pulse and blood pressure difficult to obtain; respiratory rate decreases.
28	82.4	Ventricular fibrillation possible with myocardial irritability.
27	80.6	Voluntary motion ceases; pupils non-reactive to light; deep tendon and superficial reflexes absent.
26	78.8	Victim seldom conscious.
25	77.0	Ventricular fibrillation may occur spontaneously.
24	75.2	Pulmonary edema.
22	71.6	Maximum risk of ventricular fibrillation.
20	68.0	Cardiac standstill.
18	64.4	Lowest accidental hypothermia victim to recover.
17	62.6	Isoelectric electroencephalogram.
9	48.2	Lowest artificially cooled hypothermia patient to recover.

* Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physicians.

TABLE II

Cooling Power of Wind on Exposed Flesh as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (mph)	**Actual Temperature Reading (Degrees Fahrenheit)**											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (□F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect).	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

* Developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA

Note #1: Wind speeds greater than 40 mph have little additional effect.

Note #2: Trenchfoot and immersion foot may occur at any point on this chart

TABLE III
Threshold Limit Values Work/Warm-up Schedule for 4 Hour Shift (*)

Air Temp.-Sunny Sky		**No Noticeable Wind**		**5 mph Wind**		**10 mph Wind**		**15 mph Wind**		**20 mph Wind**	
°C (approx)	**°F (approx)**	**Max. Work Period**	**No. of Breaks**	**Max. Work Period**	**No. of Breaks**	**Max. Work Period**	**No. of Breaks**	**Max. Work Period**	**No. of Breaks**	**Max. Work Period**	**No. of Breaks**
-26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm.Breaks)	1	75 min.	2	55 min.	3	40 min.	4
-29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25° to -29°	75 min	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min.	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

Notes for TABLE III:

1. Schedule applies to moderate to heavy work activity with warm-up breaks of 10 minutes in a warm location. For light to moderate work (limited physical motion), apply the schedule one step lower. For example, at -30F with no noticeable wind (step 4, a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4 hour period.

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph, light flag moves; 10 mph, light flag fully extended; 15 mph, raises newspaper sheet; 20 mph, blowing drifting snow.

3. If only the wind-chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind-chill cooling rate of about 17 W/m2; 2) all non-emergency work should have ceased at or before a wind-chill of 2250 W/m2. In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart over-compensates for the actual temperatures in the colder ranges, since windy conditions prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

* Adapted from Occupational Health and Safety Division, Saskatchewan Department of Labor.

APPENDIX D

Heat Stress

Posillico
STANDARD PRACTICE INSTRUCTION

SUBJECT
Heat Stress

1. *Purpose and Introduction*
The purpose of this document is to create an awareness among employees concerning the body's physiologic responses to heat; different types of heat stress that can affect the body; recognition of signs and symptoms; first aid treatment; and, preventive measures.

Heat stress is one of the most common (and potentially serious) illnesses at job sites. Although it is caused by a number of interacting factors, the wearing of PPE puts the worker at a much higher risk during warmer environmental conditions. The results of heat stress range from fatigue to serious illness or death. Through regular fluid replacement and other preventive measures, heat stress can be controlled, leading to increased efficiency and a higher level of safety on the job.

2. *Scope*
This program is intended for use by employees engaged in work with the potential for exposure to hot environments. This program will be reviewed annually by the Health and Safety Division. Training will be provided annually to all those potentially affected, and will include this written program.

3. *Source of Heat*

There are two sources of heat that are important to anyone working in a hot environment:

- Internally generated metabolic heat;
- Externally imposed environmental heat.

4. *Physiologic Responses to Heat*
The human body maintains a fairly constant internal temperature, even though it is exposed to varying environmental temperatures. To keep internal body temperatures within safe limits, the body must get rid of its excess heat, primarily through varying the rate and amount of blood circulation through the skin and the release of fluid onto the skin by the sweat glands. These automatic responses usually occur when the temperature of the blood exceeds 98.6°F and are kept in balance and controlled by the brain. In this process of lowering internal body temperature, the heart begins to pump more blood, blood vessels expand to accommodate the increased flow, and the microscopic blood vessels (capillaries) which thread through the upper layers of the skin begin to fill with blood. The blood circulates closer to the surface of the skin, and the excess heat is lost to the cooler environment.

If the heat loss from increased blood circulation through the skin is not adequate, the brain continues to sense overheating and signals the sweat glands in the skin to release large quantities of sweat onto the skin surface. Evaporation of sweat cools the skin, eliminating large quantities of heat from the body.

As environmental temperatures approach normal skin temperature, cooling of the body becomes more difficult. If air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot lose its heat. Under these conditions, the heart continues to pump blood to the body surface, the sweat gland pour liquids containing electrolytes onto the surface of the skin, and the evaporation of the sweat becomes the principal effective means of maintaining a constant body temperature. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. In high humidity, the evaporation of sweat from the skin is decreased and the body's efforts to maintain an acceptable body temperature may be significantly impaired. These conditions adversely affect an individual's ability to work in the hot environment. With so much blood going to the external surface of the body, relatively less goes to the active muscles, the brain, and other internal organs; strength declines; and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected. Workers who must perform delicate or detailed work may find their accuracy suffering, and others may find their comprehension and retention of information lowered.

When temperature differences exist between two or more bodies, heat can be transferred. Net heat transfer is always from the body (or object) of higher temperature to that of lower temperature and occurs by one or more of the following mechanisms:

- **Conduction**. The transfer of heat from one point to another within the body, or from one body to another when both bodies are in physical contact. Conduction can be a localized source of discomfort from direct physical contact with a hot or cold surface, it is normally not a significant factor to total heat stress.

- **Convection**. The transfer of heat from one place to another by moving gas or liquid. Natural convection results from differences in density caused by temperature differences. Thus warm air is less dense than cool air.

- **Radiation**. The process by which energy, electromagnetic (visible and infrared), is transmitted through space without the presence or movement of matter in or through this space.

5. Predisposing Factors to Heat Stress

Factors that may predispose an individual to heat stress vary according to the individual. These factors include:

- Lack of physical fitness;
- Lack of acclimatization;
- Age;
- Dehydration;
- Obesity;
- Drug/alcohol abuse;
- Infection;
- Sunburn;
- Diarrhea;
- Chronic disease.

Predisposing factors and an increased risk of excessive heat stress are both directly influenced by the type and amount of PPE worn. PPE adds weight and bulk, reduces the body's access to normal heat exchange mechanisms (evaporation, convection and radiation) and increases energy expenditure.

6. Forms of Heat Stress and First Aid

(The following excerpts were taken from NIOSH Publication No. 86-112, Working in Hot Environments):

"Excessive exposure to a hot work environment can bring about a variety of heat-induced disorders. Among the most common are heat stroke, heat exhaustion, heat cramps, fainting and heat rash.

a. Heat Stroke

Heat Stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

Individuals with signs or symptoms of heat stroke require immediate hospitalization. First aid should be immediately administered. This includes removing the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment, at a medical facility, should be directed to the continuation of the cooling process and the monitoring of complications which often accompany heat stroke. Early recognition and treatment are the only means of preventing permanent brain damage or death.

b. Heat Exhaustion

Heat Exhaustion includes several clinical disorders having symptoms which may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from heat exhaustion still sweats but experiences weakness or fatigue, giddiness, nausea or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

c. <u>Heat Cramps</u>

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. The drinking of large amounts of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly after, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs, or abdomen; but tired muscles (those used in performing the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth.

d. <u>Fainting</u>

Fainting occurs in workers not accustomed to hot environments and who stand erect and immobile in the heat.

With enlarged blood vessels in the skin and in the lower part of the body due to the body's attempts to control internal temperature, blood may pool there rather than return to the heart to be pumped to the brain. Upon lying down, the worker should soon recover. By moving around, and thereby preventing blood from pooling, the patient can prevent further fainting.

e. <u>Heat Rash (Prickly Heat)</u>

Heat rash, also known as prickly heat, is likely to occur in hot, humid environments where sweat is not as easily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin."

7. Additional General First-Aid Measures for Heat Stress Exposure

a. Call for Emergency help (ambulance or call 911).

b. Move the affected individual to a cool, shaded area.

c. Don’t leave the individual alone.

d. Remove any heavy or outer clothing.

e. Have the individual drink a small cup of cool water every 15 minutes, if they are able.

f. Try to cool the individual by fanning them.

g. Cool the skin with a cool spray / mist of water, wet cloth, or wet sheet.

h. If ice is available, place ice under the armpit and groin areas.

8. Selection of Personal Protective Equipment (PPE)

During work periods where the increased risk of heat stress exists, each item's benefit will be carefully evaluated. Once the PPE is chosen, safe work durations/rest periods will be determined based on the following conditions:

- Anticipated work rate;
- Ambient temperature and humidity;
- Level of protection.

8. Prevention of Heat Stress

Prevention of heat stress will be addressed in the following manner:

a. Adjustment of work schedules (See Attachment A).

i. Modify work/rest schedules.
ii. Enforce work slowdowns, as needed.
iii. Rotate personnel to minimize overstress or overexertion.
iv. When possible, work will be scheduled and performed during cooler hours.

b. Provide shelter or shaded areas to protect personnel during rest periods.

c. Maintain worker's body fluids at normal levels.

i. Drink approximately 12 to 16 ounces of non-caffeinated liquid (preferably water, Gatorade or equivalent) prior to the start of work. Caffeinated fluids act to dehydrate the worker.

ii. Workers will be urged to drink a cup or two every 15 to 20 minutes, or at each break. A total of 1 to 1.5 gallons of water per individual per day are recommended for fluid replacement under heat stress conditions, but more may be required.

d. Encourage physical fitness among the workers.

e. Gradually acclimatize workers on site to help build up an "immunity" to the conditions.

i. Heat acclimatization can usually be induced in 5 to 7 days of exposure at a hot job. For workers with previous experience with the job, acclimatization will include exposures of 50% for day 1, 60% for day 2, 80% for day 3, and 100% for the remaining additional days.

h. Provide cooling devices during prolonged work or severe heat exposure.

i. Supply field showers or hose down areas.
ii. Supply personnel with cooling jackets, vests, and suits.

i. Train workers in recognition and treatment of heat stress.

j. Use of the buddy system that depends on the recognition of signs and symptoms of heat stress.

k. Identification of heat-intolerant individuals through medical screening.

ATTACHMENT A
HEAT STRESS
WORK / REST REGIMENTS AND MONITORING

Introduction

Establishing a work/rest regimen that allows work to be completed in a timely manner while providing adequate rest time to prevent heat stress requires involvement of the ESS, FOL, and individuals involved. In many cases, particularly when wearing normal field type clothing (i.e., level D), awareness and communication are the key elements to a successful program. Allowing rest periods on an “as needed” basis while ensuring vigilance for initial symptoms of heat stress, encourages this success.

There are times when this approach is not appropriate. When heat stress contributing protective clothing (e.g., respirators, impermeable coveralls) are worn for extended periods, or when “as needed” work/rest regimens adversely impact either the individuals exposed to the heat source or work completion, a more formal work/rest regimen will be established.

Formal work/rest regimens are based on 1) monitoring ambient conditions (e.g., with a WBGT), estimating workloads and establishing work/rest times, 2) monitoring physiological conditions and adjusting work/rest periods, and 3) using personal heat stress monitors.

The WBGT, physiological monitors, and personal heat stress monitors will be used in accordance with manufacturer’s instructions. Personnel heat stress monitors will be approved for use by the PESM.

I. WBGT Based Work/Rest Regimens

A. Work/Rest Regimens

The WBGT will be used in conjunction with the work load to determine the appropriate work/rest regimen for personnel wearing regular work clothing or semipermeable disposal coveralls (uncoated Tyvek). Light work examples include sitting or standing or performing light hand or arm work. Moderate work includes walking about with moderate lifting and pushing. Heavy work corresponds to pick and shovel-type work.

The work/rest regimen using the WBGT procedure will be used as a guideline. Table A-1 outlines the work/rest regimen guidelines based upon WBGT temperature and work load. Table A-2 identifies the correction factors. The WBGT temperature will be determined in accordance with Section B of this attachment.

Table A-1. Examples of Permissible Heat Exposure Threshold Limit Values.
(Values are given in °F WBGT)*

		Workload	
Work – Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous Work	86	80	77
75%Work -	87	82	78
25% Rest, each hour			
50% Work -	89	85	82
50% Rest, each hour			
25% Work -	90	88	86
75% Rest, each hour			

*Notes on Table B-1

1) These values are for fully acclimated workers wearing light weight pants and shirts. For conditions other than this use this table with the correction factors from Table B-2.

2) These values assume that workers drink frequently and have properly increased salting of food prior to exposure.

3) These values are guidelines. Actual levels may be modified based on individual physiological response and actual work and rest conditions.

4) These values assume that the rest location is cool enough to alleviate heat load conditions.

Table A-2. Correction Factors for Table B-1 in ºF*

Clothing Type	WBGT Correction
Summer work uniform	0
Cotton overalls	-3.5
Winter work uniform	-7
Water barrier, permeable	-11
Condition	**WBGT Correction**
Unacclimatized worker, moderate work load	-4.5

*To use this table, identify the most restrictive applicable clothing type and whether unacclimatized workers are involved. Add the two. Modify Table B-1 temperatures by this amount. For example, the Table B-1 TLV for continuous work, light workload is 86ºF. If cotton overalls (-3.5) are work and acclimatized workers are acclimatized (no additional change) the modified limit is 82.5ºF.

B. WBGT Determination

If the Web Bulb Globe Temperature (WBGT) is used to determine if field conditions are conducive to heat stress, the WBGT is determined through the following equations:

(1)

Outdoors with solar load:

WBGT=0.7 NWB+0.2GT+0.1DB

(2)

Indoors or outdoors with no solar load:

WBGT=0.7 NWB+0.3GT

Where:

WGBT = Wet Bulb Globe Temperature Index
NWB = Natural Web-Bulb Temperature
DB = Dry-Bulb Temperature
GT = Globe Thermometer Temperature

The factors involved in the above equations can be measured in the following manner:

- Through the use of a direct-reading heat stress monitor capable of measuring all of the individual factors associated with the WBGT equation. For example, the Reuter-Strokes Wibet No. RSS-214 heat stress monitor.

- By measuring the individual factors manually using the following type of equipment

  Natural Wet-Bulb Temperature Thermometer
  Dry-Bulb Temperature Thermometer
  Globe Temperature Thermometer Stand

II. Adjusted Temperature Based Work/Rest Regimens

When wearing impermeable protective clothing, the use of work/rest regimens based on WBGT is not recommended. The WBGT index is designed to account for the effects of evaporative cooling. Vapor barrier clothing impedes the evaporation of sweat and renders the WBGT an inappropriate physiological model. The most important environmental conditions related to heat stress for workers wearing impermeable protective clothing have been suggested to be the ambient dry bulb temperature and the radiant solar heat. These factors are combined into an index called the adjusted temperature using the following formula:

$$T^{o} \text{ adjusted} = \text{ambient dry bulb temperature} + (13 \times \% \text{ sunshine})$$

where % sunshine is an estimate of the amount of time the sun is covered by clouds thick enough to product a shadow. The thermometer bulb should be shielded from radiant heat when taking measurements.

The adjusted temperature values are then used to determine the initial work/rest regimen and physiological monitoring frequency. Table B-3 gives the work period and monitoring frequency. Initially, rest periods will be at least 15 minutes. Physiological monitoring that is normally recommended is pulse rate and body temperature. Procedures for each are described below. Initially, both should be done. Pulse rate monitoring may be discontinued with the approval of the PESM if temperature monitoring proves to be effective.

WORK/REST REGIMENS

A. Pulse Rate Monitoring

When 70°F is reached, a baseline pulse will be recorded. Take the pulse immediately at the start of each rest period (P1). Take the pulse again 2 ½ to 3 minutes into the rest period (P2). If any of the following conditions exist, shorten the next work period by a third:

P1 > 110 beats per minute (bpm)
P2 > 90 pbm
P1 – P2 > 10 pbm

Pulse rates can be taken with an electric pulse meter, or manually with a stopwatch for 30-seconds.

B. Body Temperature

When 70°F is reached, a baseline temperature will be recorded. Body temperature will be taken immediately at each start of the rest period. If the oral temperature exceeds 99.5º shorten the next work period by a third. Do not return the worker to hot work in semipermeable or impermeable clothing until the oral temperature is less than 99.5ºF.

Oral temperatures may be taken with disposable oral thermometers or infrared ear drum scanners, such as the Thermoscan. Note: If a Thermoscan unit is purchased, the Pro Model should be selected. The home model available through drugstores cannot be recalibrated.

C. Removal from Exposure

If an individual requires a shortening of the work period on more than two consecutive monitoring periods, or repeatedly over a few days, they should be removed from exposure to hot environments wearing semipermeable impermeable protective clothing until examined and cleared for such work by the consulting physician.

Table B-3. Initial Work Period and Physiological Monitoring Frequency [1]

ADJUSTED TEMPERATURES	SCHEDULE
90ºF or above	15 Minutes
87.5º - 90ºF	30 Minutes
82.5º - 87.5º	60 Minutes
77.5º - 82.5ºF	90 Minutes
70º - 77.5ºF	120 Minutes

[1] Schedule is for fit and acclimatized workers in impermeable protective clothing.

APPENDIX E

POSILLICO CORPORATE HEALTH & SAFETY PLAN

Furnished upon request.

APPENDIX F

HAND AND POWER TOOL USAGE

Purpose

The purpose of this program is to establish safe work practices for the use of hand and power tools. Because we are reliant so heavily on this type of equipment and use it frequently, hand and power tools are the direct source of many injuries on our projects.

We must ensure our tools are used correctly, properly maintained and removed from service when no longer suitable for use.

Above all, only qualified and trained personnel will be permitted to use these tools.

Applicable Regulations

OSHA 29 CFR 1926.300

Responsibilities

Project Management shall:

Purchase all hand and power tools according to company program specific to brand and model;

Ensure that all tools requiring guards are equipped as such before they are put into service on the job; and

Develop a procedure for the distribution of abrasive wheels for cutoff and chop saws.

Employees shall:

Not remove any guard on a hand or power tool;

Inspect hand and power tools prior to use to ensure safe operating condition; and

Tag out, and report any damaged or defective tools to their foremen.

Procedural Overview

General Requirements

Maintain all hand and power tools and similar equipment in a safe condition;

When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use. Should the guard obstruct the work, it will not be removed;

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard;

Impact tools, such as drift pins, wedges and chisels, shall be kept free of mushroomed head; and

The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

Power-Operated Hand Tools

Electric power operated tools shall either be the approved double-insulated type or effectively grounded;

Do not use a power tool with broken or defective insulation on the cord, broken or defective plugs, or loose or broken switches;

The use of electric cords for hoisting or lowering tools is not permitted; and

If the tool is provided with a side-mounted handle, it must remain on the tool to prevent wrist injuries should the tool bind during operation.

Trigger locks must be removed from grinders or made inoperable by a qualified person.

Powder Actuated Tools

Loading

Tools shall not be loaded until just prior to the intended firing time; and

The tool shall be tested each day before loading to see that the safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.

Use

Use the lowest velocity on the tool until sufficient penetration is found;

Any tool found not in proper working order, or that develops a defect during use, will be immediately removed from service, tagged out and not used until properly repaired;

Neither loaded nor empty tools are to be pointed at any employees;

Keep hands clear of the open barrel end;

Do not leave loaded tools unattended;

Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile;

Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side;

No fastener shall be driven into a spalled area caused by a prior unsatisfactory fastening;

Tools shall not be used in an explosive or flammable atmosphere; and

All tools shall be used with the correct shield, guard, or attachment recommended or supplied by the manufacturer.

Charge Storage

Live loads/cartridges must be stored in an approved, locked storage cabinet to meet applicable OSHA regulations. Pick up and dispose of unfired shots, do not throw explosive charges into trash containers or leave them lying around. Return them to your supervisor.

PPE

Personal protective equipment, including eye, ear, head, and hand protection is to be worn by all tool operators.

Training

Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool. Users shall possess a qualified operator's card that is issued by the manufacturer's representative.

Air Powered Tools

Hoses

Air hoses will be inspected prior to use looking for bends, kinks, or swelled areas. Hoses that are not in good condition shall be removed from service. DUCT TAPE IS NOT TO BE USED FOR REPAIRS;

Hoses used under compressed air conditions must be a reinforced wire braided type. Hoses used for water service may be standard airline hose;

Hoses will not be placed in access ways or across ladder passage. Where this is unavoidable, lines should be blocked over, or at least flagged;

Whip checks will be used on all airlines and tools to prevent against the hazards when uncoupling occurs. Whip checks shall be positioned on the hose rather than the fitting – if the hose should break, the fitting may stay connected while the hose will whip around; and

All air hose clamps must be crimped into place. Do not use worn gear clamps to attach couplings and fittings to air hoses.

Chicago or Air King type pneumatic fittings must be pinned.

Use

Air powered tools should be oiled via in-line air oil;

Air powered tools and compressed air create certain health hazards where fine particles of dust, or chemicals are blown into the air. This air contamination should be eliminated by wetting agents, or exhaust ventilation;

Loose clothing, which can get caught in the moving parts of equipment, should not be worn while working with rotary tools;

Compressed air should not be used to clean off clothing. Air pressure against the skin can penetrate causing internal hemorrhaging and intense pain. Air that enters body openings can burst internal organs and lead to death;

When air powered tools create hazards to others, warning signs or placards shall be posted detailing the type of hazard(s) and direction for protection; and

Airlines must be turned off and bled of pressure before connecting/disconnecting an air tool, unless the connector is specifically designed for connection/disconnection under pressure.

PPE

When silica or lead exposures are present when using air powered tools, use appropriate respiratory protection;

Demolition operations may require steel-toed boots and/or metatarsal protection; and

When performing any operation with an air powered tool that produces high vibration levels, carpal tunnel gloves should be used.

Abrasive Tools

Bench Grinders

Grinders shall be labeled with maximum operation R.P.M.;

Adjustable work rests shall be provided and kept at a distance not to exceed 1/8-inch from the surface of the wheel;

Objects that may kick back must be braced using a clamp or any device that securely holds objects prior to cutting;

Face shields shall be worn while using a bench grinder.

Hand-held Grinders

Guards shall remain in place at all time, or the grinder is not to be used;

Trigger locks must be removed from grinders or made inoperable by a qualified person. A positive pressure switch shall be used;

Many grinders are supplied with handles designed to protect against wrist injuries, as well as support the tool. They shall not be removed, regardless if they interfere with the operation. A substitute tool should be considered;

Arbor on the grinding wheel must be the exact same size as the arbor shaft on the grinder;

Grinders shall be labeled with maximum R.P.M.;

Only abrasive wheels, which are compatible with the rated RPM, will be used;

A face shield must be used when using grinder plus safety glasses; and

When grinders with blades 7’ or bigger are used, chaps will be required at the discretion of the Project Management.

Abrasive Blades/Wheels

Only approved blades will be used;

Suitable Abrasive blades shall be used only on designated materials;

Only a qualified person shall mount blades per manufacturer’s instructions;

Blades should be stored in a climate-controlled area (avoid freezing, extreme heat, or wet conditions);

Use blades only on designated tool (i.e., do not use chop saw blades on a cut-off saw);

Discard all abrasive blades with illegible/unreadable labels;

Fully inspect all blades prior to use;

The arbor hole should match the arbor of the tool, use only manufactured arbor adapters;

The RPM of the wheel shall equal or exceed the RPM of the tool;

Blades will be removed from the tool whenever, the tool is transported by vehicle, the tool is being stored, and the condition of the blade is suspect;

Allow newly mounted wheels to run at full RPM for at least 1-minute prior to use; and

Using the side of the “cutting” blade as a grinder is strictly prohibited.

Chainsaws

Equipment

When purchasing chain saws, always buy those with anti-kickback chains. Regular chains should be disposed of and replaced with anti-kickback chains. Anti-kickback chains are designed to skim the surface of the work in the event that the upper part of the chain comes into contact with the work. Older chains have a flat link between each of the raised cutters while newer chains have either a triple thick raker in front of each cutter or an extra raised section between cutters.

All chainsaws shall be equipped with a momentary finger contact or constant pressure "on/off" control switch that will shut off power when the pressure is released;

Chain rotation will stop when saw is in idle;

All saws must have spark-arresting mufflers; and

Electric chain saws shall be approved, double insulated, or effectively grounded.

Inspection and Service

Equipment will be inspected before use for defects and broken or worn chains. Any chain saw that is broken or defective must be taken out of service, tagged and repaired immediately or removed from the job;

Chains shall be kept sharp, well lubricated and properly tensioned at all times. The chain needs sharpening when it must be pushed through to cut or when it throws sawdust rather than wood chips;

Chain saws shall be inspected before each day's use and during each refueling. Saws that are not in safe operating condition will not be used; and

If electric chainsaws are used, disconnect the power source from the chain saw before making any adjustments or repairs.

Use

Do not walk with a running chainsaw;

Work "down" with the saw whenever possible;

If electric chainsaws are used, never use the cord to hoist or lower the tool;

Before refueling, saws must be cool to the point that spilled gas will not ignite;

Keep the air filter clean and use the correct mixture of fuel and oil;

Fully charged 20lb. ABC fire extinguishers shall be kept at all refueling areas;

Saws must be kept clean of excess oil to prevent slipping or fire hazards. Any spills that occur must be cleaned up immediately;

Chain saws will be carried or moved with the engine in the off position;

When starting a chain saw, place it on the ground, hold the handle with one hand and pull the starter with the other hand. Never start a saw by "drop starting" in the air, or on your leg;

Running saws must be gripped with both hands; and

Maintain a clear work area free of tripping hazards and obtain firm footing before commencing any work. Keep your weight balanced on both feet and do not over reach.

Personal Protective Equipment

Employees using chain saws are exposed to flying debris, dust and noise. Kevlar fire resistant leg chaps, hard hats, safety glasses and face shields (mesh is acceptable), and gloves are required when working with chain saws. No loose or ragged clothing will be allowed. Additionally, effective hearing protection must be worn.

Training

Always read and become familiar with the manufacturer's instructions before use; and

Operators shall be trained in the safe operation and maintenance of chain saws, proper tree falling procedures and the use of personal protective equipment.

Cut-Off Saws

Inspection

Ensure the guard is installed and functioning as intended by the manufacturer;

Handles are installed and functioning as intended by the manufacturer;

Trigger releases freely when released;

Muffler is installed;

Ensure no bolts are missing and all bolts are tight and functioning as intended by the manufacturer;

The pull cord handle is not broken or cracked;

The RPM of the tool is clearly marked on the tool;

The wheel flanges are clean and straight so the blade will spin true. The wheel flanges are recessed and are of the same diameter;

The wheel flanges are at least one-fourth the size of the blade;

The wheel arbor is the correct size for the blade. Never alter a wheel arbor to force a blade to fit the cut-off saw; and

If there is a blade in the tool, remove the blade and follow blade inspection guidelines.

Personal Protective Equipment

Employees using cut-off saws will wear a hard hat mounted full-face shield in addition to safety glasses;

Proper, effective, hearing protection;

Proper protection from silica (see Silica Exposure Program);

Kevlar fire resistant leg chaps; and

Suitable, Leather work gloves.

Abrasive Blade Storage

Store blades on a level and firm surface;

Do not subject the blades to heat, moisture, high humidity, rain or snow, freezing, or condensation;

It is recommended that blades be stored in a controlled atmosphere such as the project office or tool crib and that a blade distribution and inventory program be put in place;

Never transport the cut-off saw with the blade mounted; and

Remove blades after each use and if serviceable, return them to a proper storage area. Do not store the cut-off saw with the blade installed.

Abrasive Blade Inspection

Do not use broken, cracked, warped, wet or otherwise damaged blades. Do not use blades if the blade label is unreadable;

Remove the blade from the cut-off saw for inspection. You can not properly inspect a blade while it is mounted; and

Check the maximum operating speed for the blade as indicated on the blade label. The blade's maximum rated RPM must be equal to or greater than the maximum RPM of the cut-off saw.

Diamond Cutting Wheels

The manufacturer's instructions for use of diamond cutting wheels must be reviewed prior to installing the blade;

Following the minimum guidelines established for abrasive blades above to supplement the manufacturer's recommendations;

Diamond cutting wheels are intended for use when cutting concrete, masonry, architectural stones and granite, clay pipe and other materials only as recommended by the manufacturer;

Do not use diamond cutting wheels to cut metal or any other materials not recommended by the manufacturer;

Consider using water when cutting to eliminate silica exposure; and

Check the maximum operating speed for the blade as indicated on the blade label . The blade's maximum rated RPM must be equal to or greater than the maximum RPM of the cut-off saw.

Fueling

Fuel the saw in a well-ventilated area, outdoors only;

Always shut the engine off and allow it to cool before refueling.

Relieve tank pressure by loosening the fuel cap slowly;

Always use a funnel and avoid over filling the tank;

Select bare-ground for fueling and move at least 10 feet from the fueling spot before starting the engine; and

Use the manufacturer's recommended fuel mix of oil and gasoline.

Have a suitable fire extinguisher ready for instant use.

Starting Instruction

Do not drop start. Place the cut-off saw on level ground and have a firm grip on the handle to pull start the engine;

Never attempt to start a saw that is in a cut, as it may rebound; and

Position your body so that it is clear of the cutting attachment before pull starting. Adjust loose clothing to eliminate entanglement in the cutting attachment.

Cutting Operations

Review and understand the job hazard analysis, (JHA), prior to using the cut-off saw;

Check that the wheel arbor matches the blade arbor speed;

Check that the blade's maximum RPM is equal to or greater than the maximum saw RPM. Select a blade specifically designed for use for the type of material you are going to cut;

Tighten the wheel flanges to secure the blade;

Allow the blade to spin freely at operating speed for at least one minute prior to use;

If you feel unusual vibration, stop the saw, determine the reason for the unusual condition, and correct he problem before using the saw again;

Maintain balance and solid footing while cutting. Do not over reach or position yourself in any way that could cause you to fall or lose control of the saw, particularly if the saw was to "kick back";

Adjust the guard to throw sparks away from your body. Remove any flammable items prior to beginning the cut, warn others near-by;

Do not attempt to cut anything above your shoulder height;

Let the tool do the work. Do not force the blade into the cut;

Make sure the blade has stopped spinning before letting go of the handles;

Carry the saw with the blade to the rear;

Do not transport the cut-off saw with the blade attached. Do not grind with the side of the cutting wheel. Inspect the tool and the blade before each use; and

When you are done with the cut-off saw, remove the blade and return the saw, blade and PPE to its designated storage area.

Chop Saws

General

Use only wheels designed for the saw (RPM rating on blade must meet or exceed that of the saw) and compatible with the material being cut;

Be sure to follow lock-out/tag-out procedures when changing wheels or performing any repairs; and

Do not remove the wheel guard.

Cutting Operations

Make sure the tool is on a solid base and access to the tool is free of debris;

Use a vice to clamp/hold the work when necessary;

Never start the tool with a person directly in-line with the wheel, this includes the operator;

Do not cut masonry or wood with a chop saw, and only use correct blade for the item being cut;

Do not force the tool through the work; and

The saw should return to an open position after a cut. If it does not, the spring assembly may need repair.

APPENDIX G

LINE BREAK PERMIT

LINE BREAK PERMIT

☐ Contractor Name ______________________________

☐ Subcontractor/Lower-tier Name (if applicable) ______________________________

Project ______________________________ Contract/PO/Release ______________

Location (i.e., building, area, etc.) ______________________________

Date of Line Break ______________________________ Time ______________

Service Being Broken ______________________________ Line Number ______________

Hazards (list all types of potential hazardous energy; also list all hazardous chemicals/material thought to ever have been in the line)

Special Instructions

PROTECTIVE MEASURES

Personal Protective Equipment Required	Check Yes	Check No	Date Complete	Other Protection Methods	Check Yes	Check No	Date Complete
Boots – Rubber	☐	☐		Barricade – Radius (above/below)	☐	☐	
Coveralls – Cloth	☐	☐		Blanks to be Installed	☐	☐	
Coveralls – Tyvek	☐	☐		Block Valve Shut	☐	☐	
Dosimetry – Radiation (specify)	☐	☐		Blower	☐	☐	
Film Badge – Chemical (specify)	☐	☐		Fire Extinguisher	☐	☐	
Gloves – Leather	☐	☐		Grating, Floor Opening Covered	☐	☐	
Gloves – Long	☐	☐		Lockout/Tagout Required	☐	☐	
Gloves – Rubber	☐	☐		Monitoring (specify)	☐	☐	
Goggles	☐	☐		Nonsparking Tools	☐	☐	
Hood – Acid	☐	☐		Piping Support Installed/Needed	☐	☐	
Respirator – Full Face	☐	☐		Pump Locked Out	☐	☐	
Respirator – Half Face	☐	☐		Spark Proof Tiles	☐	☐	
Respirator – Air Supplied	☐	☐		Standby Person (required for first time breaks)	☐	☐	
Respirator – SCBA	☐	☐		System Flushed	☐	☐	
Shield – Face	☐	☐		System Less than 100 °C (212 °F)	☐	☐	
Shield – Special Shielding	☐	☐		System Vented	☐	☐	
Suit – Acid	☐	☐		Valve Locked Out	☐	☐	
Suit – Hot	☐	☐		Ventilation – Exhaust	☐	☐	
Suit – Rain	☐	☐		Ventilation – Dilution/General	☐	☐	
Other:	☐	☐		Water Hose	☐	☐	
Other:	☐	☐		Other:	☐	☐	
Other:	☐	☐		Other:	☐	☐	
Other:	☐	☐		Other:	☐	☐	
Other:	☐	☐		Other:	☐	☐	

LINE BREAK PERMIT

PLANNING ITEMS FOR LINE BREAKS	
1. Fire Extinguisher Location	
2. Planned Escape Route	
3. Nearest Eyewash Location	
4. Cold Pak Location	
5. Scott Air Pak Location	
6. Other	
7. Other	
8. Other	
9. Other	

SIGNATURES			
Posillico Environmental Site Manager	Date		Date
Subcontractor (if applicable)	Date		Date
Health and Safety Supervisor	Date		Date

RELAXING PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS	
Date	Time

Personal protective equipment reduced to items listed below following first line break (if applicable)

PREJOB SAFETY PLANNING SIGNOFF

☐ AHA reviewed (check)

I have read the attached AHA (and attachments) and understand the hazards associated with this job.

☐ Prejob meeting – general ☐ Energized work permit prejob ☐ Fall protection work plan

☐ Hoisting & rigging prelift ☐ Confined space preentry briefing ☐ Asbestos work plan

☐ Other (specify): ______________________________

Project Number ____________________ Project Location ____________________

Date	ID No.	Name (Print)	Signature	Asbestos Work Plans Only	
				Asbestos Cert No. and Expiration Date	Date Competent Person Assigned

APPENDIX H

MOTORIZED VEHICLES AND EQUIPMENT

Motorized vehicles and equipment

1. Do not ride on motorized vehicles or equipment unless a proper seat is provided for each rider.

2. Always be seated when riding authorized vehicles (unless they are designed for standing).

3. Do not operate any motorized vehicle or equipment unless you are specifically authorized to do so by your supervisor.

4. Always use your seat belts in the correct manner.

5. Obey all speed limits and other traffic regulations.

6. Always be aware of pedestrians and give them the right-of-way.

7. Always inspect your vehicle or equipment before and after daily use.

8. Never mount or dismount any vehicles or equipment while they are still in motion.

9. Do not dismount any vehicle without first shutting down the engine, setting the parking brake and securing the load.

10. Do not allow other persons to ride the hook or block, dump box, forks, bucket or shovel of any equipment.

11. Each operator must be knowledgeable of all hand signals and obey them.

12. Each operator is responsible for the stability and security of his/her load.

13. Any accidents or damage must be reported to your supervisor immediately.

14. The Operator is responsible for the safe operation of the vehicle, machine or equipment they are operating.

15. Do not transport workers and tools in the same compartment, there must be a physical separation to prevent tools and supplies from sliding into or falling on workers.

16. Vehicles or equipment must be physically inspected before being placed into use.

For other rules and regulations regarding motor vehicles, mechanized equipment and marine operations, please refer to OSHA construction Safety Standards..

Posillico | *Equipment / Vehicle Inspection Checklist*

Date: ____________________ Equipment / Vehicle #:__________________

Job #: ___________________ Location: ____________________________

Operator / Driver's Name (print): _______________________________________

PRIOR TO USING MACHINE / VEHICLE INSPECT THESE ITEMS		
Item to Check	**OK**	**Action Needed**
Corrections of the following defective items must be made as soon as possible, but you can still use the equipment / vehicle if defects in these items exist.		
1. Engine Oil		
2. Radiator Fluid Level		
3. Condition of Tires		
4. Undercarriage / Tracks		
5. Fire Extinguisher (if equipped)		
6. Cab Housekeeping and Condition		
7. Inspection and Registration		
The following items are considered to be **CRITICAL SAFETY ITEMS**. No equipment / vehicles can be operated until defects present in any of the following items are repaired.		
8. Wheel Lug Nuts		
9. Hydraulic Leaks		
10. Seat Belts		
11. Warning Lights / Buzzer		
12. Cab Glass		
13. Back-up Horn / Alarms		
14. All Lights		
15. System Air Pressure		
16. Wipers		
17. Parking Brake		
18. Service Brakes		
19. Other:		

Has the Shop been notified of any items requiring repairs? ☐ Yes ☐ No

Additional Comments: ____

____

____

APPENDIX I

CONFINED SPACE AND HOT WORK

CONFINED SPACE/HOT WORK PERMITTING PROCEDURE

1.0 Introduction

Welding, cutting, brazing and other hot work operations are a necessary part of the industrial world, both in manufacturing and construction. Too often, the people who hire, use, or supervise the use of these processes don't understand the hazards behind them, which can result in loss of life, property, or both, by fire and explosion.

Any material that is combustible or flammable is susceptible to ignition by heat-producing activity. Common materials such as floors, partitions, roofs, wooden members, paper, textiles, plastics, chemicals, flammable liquids and gases, and grass or brush are very likely to become involved in fire during hot work operations if adequate precautions are not taken.

Hot work is any work that requires the use of tools/equipment that have the potential to produce temperatures which could reasonably be expected to ignite flammable/combustible material or atmospheres in the vicinity of the work area. These tools/equipment have the capability of producing sparks, open flames, heat, or an electrical arc during use. Hot work is not limited to just welding, cutting and brazing, but also grinding, sawing (metal to metal) and chipping operations.

Confined spaces are spaces that can be bodily entered but are not meant for human occupancy. Confined space hazards exist if the potential for hazardous or explosive atmospheres and/or oxygen deficient hazards exist. Other hazards that could exist include mechanical sources and falls. Two types of confined spaces exist: permit required and non-permit required.

2.0 Purpose

To provide Posillico employees and subcontractors, who oversee or perform hot work and confined space entry on projects, with a standard permitting and safety procedure to prevent injury or loss of life and property. To be used as a reference in instances where hot work/confined space entry is performed and as a permit procedure in instances where one is not available.

3.0 Scope

This procedure will apply to all Posillico employees and subcontractors who oversee or perform hot work on projects utilizing welding, cutting, brazing, grinding, chipping, portable heaters, and other potential heat-producing equipment for field/facility activities. This procedure is also to be followed for all confined space entry situations. This procedure will apply to all contractors or subcontractors working under Posillico that do not have an adequate Permitting Procedure in place with the company in which they are currently employed. All Posillico employees involved with confined space entry will be properly trained for the role and duties performed. Training will consist of hands-on training with Posillico’s confined space entry equipment including harnesses, retrieval equipment, air-line respirators and monitoring equipment. Certification that the training was satisfactorily complete will be provided and documentation maintained.

4.0 Procedure

1. Hazard Identification

a. The Project Manager will identify all work that requires tools, equipment, or operations that may produce sparks or temperatures that are sufficient to ignite flammable/combustible materials or atmospheres.

b. The Project Manager will determine if a confined space entry is required and determine if the entry requires a permit. Any situation that has the potential to produce hazardous atmospheres or deplete oxygen will require a permit.

c. This information will be included in the Site Specific Health and Safety Plan to be reviewed with the Health and Safety Division prior to starting the project.

d. The Project Manager will determine if the work can be performed without the use of hot work, i.e. alternative method to reduce the hazard.

e. The Project Manager should consult the Health and Safety Division if the Project Manager has questions on hazard determination. The Project Manager will act as the Entry Supervisor.

f. The Safety Director will review entry with the Project Manager and review this program at least annually to make sure the Program is effective and enforced. Copies of completed permits will be retained for at least one year.

g. The permit program will be reviewed to determine if it is adequate for the projects conducted. Incident reports will be reviewed, employee issues raised and entries reviewed. The permit program will be evaluated to determine if all hazards were adequately identified and evaluated. Additional protective equipment will be purchased, if necessary, for future entries if the review process shows that all hazards were not properly controlled. This review will be part of annual confined space training.

2. Area Preparation

a. The following preparation for the work area will be made once it is determined that hot work is necessary:

- All flammable/combustible materials will be relocated at least 35 feet away from the work area.

- All combustible materials that cannot be reasonably removed from the area will be covered with a fire blanket.

- An appropriate fully charged fire extinguisher and/or charged fire hose will be available at the work area before, during and 1/2 hour after hot work procedures have ended.

- All safety equipment will be on-site and functional.

- The confined space entry area will be appropriately marked and barricaded to prevent impact from external hazards and vehicles. Ground level entries will be ringed with a toe board to prevent objects from inadvertently being dropped into the space.

3. Pre-Work Safety Meeting

   a. The Project Manager will assure that a pre-work safety meeting has been provided to the crew prior to any hot work/confined space entry being performed. Individuals involved with confined space entry will be identified as the authorized entrant(s), attendant and the entry supervisor. Additional individuals may be designated to conduct monitoring for multiple entries. This meeting will include, but not be limited to:

      - Permitting conditions (environmental conditions, type of work to be performed). This would include reviewing the results of the initial monitoring of the test results, ventilation requirements, potential hazards and continuous testing procedures.

      - Personnel authorized to sign-off on the permit. All personnel involved with the confined space entry must sign the permit and acknowledge the hazards expected to be encountered.

      - Location of the permit. (Must be conspicuously posted.)

      - Type of monitoring required. Employees involved with the entry may request additional monitoring or increasing monitoring frequency at any time.

      - Designation of attendant and discussion of duties.

      - Return completed permit to Project Manager or client when work is complete and project has concluded.

   b. During the pre-work safety meeting the authorized entrants will be identified and the entry procedure reviewed. The attendant will be specified and the monitoring and communication procedures reviewed. The entry will be reviewed with the designated entry supervisor before entry. The attendant will be responsible for conducting the air monitoring during the entry and providing results to the entrants and entry supervisor. The designated positions will be posted on the entry permit.

   c. The entry supervisor will be responsible for meeting with the client prior to entry to identify if other contractors or client personnel will be working in close proximity to the confined space entry. The entry supervisor will coordinate entry activities in order to make sure the other work does not impact the entry or endanger entry personnel. The entry supervisor will attend scheduled project meetings with the client and other contractor representatives in order to properly coordinate the entry with other projects.

d. Initial air-monitoring results will be reviewed with the entry supervisor and the authorized entrants prior to entry. Air-monitoring procedures and alarm levels will also be reviewed. Ventilation of the space will be initiated before entry and periodic monitoring conducted prior to entry to verify the ventilation is adequate. Monitoring will be performed throughout entry by the attendant and entrants will wear dosimeters with alarms to conduct monitoring during the entry.

e. The Project Manager will meet with the client to arrange for adequate rescue services from the client, if available, or from outside rescue operations. The Project Manager will discuss rescue procedures with representatives of the rescue operation and allow the rescue team to examine the area, practice the rescue and decline to act as the rescue team if they feel they are not adequately staffed or equipped. The entry cannot be conducted until adequate rescue services are provided.

f. The Project Manager will meet with the client to discuss other projects or contractors that could interfere with Posillico's confined space work. Posillico will coordinate the entry to have minimal impact on other contractors in the area and to make sure Posillico personnel are not endangered by other contractors work.

4. Permit Completion

The Confined Space Work Permit (see Attachment A) will be completed by the Project Manager prior to beginning work each day. The permit will not be considered valid until all personnel involved with the entry have reviewed and signed the entry permit. The entry supervisor will review each permit at the completion of the entry to determine if monitoring and safety procedures are adequate for this project. The permit will be modified if appropriate. The permit will be conspicuously posted at the site of the work.

5. Attendant

A designated Attendant will be present to observe the hot work/confined space operation. The Attendant will maintain contact with personnel and conduct air monitoring. The Attendant will oversee safety retrieval systems and initiate the alarm if rescue is necessary. The Attendant will not perform entry rescue or enter the confined space unless relieved of duty by another authorized Attendant and is equipped with maximum respirator protection. The Attendant will monitor only one confined space entry at one time.

6. Entrant

Entrants will be identified on the permit and instructed on the purpose for the entry of the confined space. Entrants are responsible for adhering to the permit requirements and communicating with the Attendant. Once work tasks are completed the Entrant is responsible for removing equipment, sampling devices and exiting the confined space safely.

7. Atmospheric Monitoring

a. When cutting, grinding, heating or welding surfaces coated with epoxy finishes or paint, or when cutting certain metals with a welding torch, toxic fumes or vapors can be emitted in the process. In these instances, monitoring may be required under the

OSHA Standard. Therefore, it is the responsibility of the Project Manager to notify the Health and Safety Coordinator of these coatings and have them sampled (if unknown) to determine what type of monitoring will be required.

b. Occasionally, a "liner" will be adhered to the inside of a metal duct or tank. When hot work will be performed on such material, the liner will be removed at least 4 inches to each side of the cut to prevent toxic vapors from being emitted, or fire from occurring.

c. After moving all flammable materials out of the work area, the area will be monitored with a Combustible Gas Meter immediately before hot work takes place. LEL readings at or above 5% will necessitate that the area be ventilated before hot work operations begin. **Hot work should not proceed if readings of five percent or below cannot be achieved.**

d. All area monitoring must be performed a minimum of once every 10 minutes when the hot work area is located in a low lying area down slope from a storage area containing flammable and/or combustible liquids.

e. Hot work performed in confined spaces requires that contaminant specific air monitoring be performed. Contact the Health and Safety Division to determine the type of air monitoring required for the contaminant.

f. Hot work performed on containers that previously contained flammable liquids (i.e. underground storage tanks) will not be performed until the Health and Safety Division has been contacted and has approved the work to be performed. Posillico's Site Specific Health and Safety Plan for Flammable and Combustible Underground Storage Tank Removals contains detailed procedures for cleaning, inerting and cutting these types of containers.

g. Entrants and the attendant will continuously evaluate the permit-required space to determine if additional monitoring or more frequent monitoring is necessary. The permit may be revoked or modified accordingly. All entrants will leave the space if unsafe conditions are observed or measured. The permit will be invalidated and reviewed with the supervisor before re-entry is allowed. Additional monitoring will be performed at the request of employees or attendants.

8. Prohibitive Circumstances

   a. Hot work will be prohibited if any of the following conditions exist:

      - Oxygen levels greater than 21%.
      - LEL greater than 5%.
      - Organic vapor concentration greater than Permissible Exposure Limits depending on contaminant (ventilation may reduce this hazard).

- Confined space entry will not be permitted if oxygen levels are below 19.5% or if the LEL is >10%. Individual hazardous constituents will be monitored and appropriate levels of respiratory protection will be issued.

9. Conditions of Permit Validity

   a. A permit is not valid unless all necessary inspections and air monitoring (if required) have been performed and all required signatures appear on the permit.

   b. Work permits will be judged as valid for the following time durations:

      - Shift or significant change in personnel.

      - Duration of the hot work.

      - When atmospheric changes dictate ceasing the operation, abate the hazard and reinspect the work area before completing another permit.

   c. Permits are valid up to one day and new permits must be completed each day or whenever the permit conditions change.

   d. The local Fire Department or client emergency services will be contacted prior to entry into confined spaces. They will be notified of the reason for entry and be requested to be available for rescue and administrating first aid. If emergency rescue cannot be provided within three minutes Posillico will not conduct the entry. The permit program will be reviewed to determine if it is adequate for the projects conducted. Incident reports will be reviewed, employee issues raised and entries reviewed. The permit program will be evaluated to determine if all hazards were adequately identified and evaluated. Additional protective equipment will be purchased, if necessary, for future entries if the review process shows that all hazards were not properly controlled. This review will be part of annual confined space training.

   e. Posillico will coordinate the entry with client and/or other contractors present at the job site. Work will be evaluated to determine the impact by non-Posillico staff on the work being conducted.

   f. If conditions change and Posillico employees are at risk the permit will be considered invalid.

   g. The permit will be canceled once the project is complete or conditions change that warrant leaving the site. A new permit will be issued for future entries once a permit has been canceled.

10. Training and Program Review

All workers involved with confined space entry will receive training relative to their role on the project. Since Posillico conducts confined space entry infrequently, training will be conducted prior to each project in order to refresh Posillico employees on the use of the equipment, monitoring procedures and the confined space entry program. The program will be reviewed annually or when new equipment is acquired. All completed permits will be reviewed and critiqued at the completion of each entry. The entrants and attendants will be interviewed after entry to determine if there were significant problems or concerns.

5.0 Definitions

Fire Blanket: Blanket made of fire-resistant material, such as NOMEX or KEVLAR (**not asbestos**), or treated wool, which can be used to cover combustible materials to prevent their ignition from sparks, flames or heat during hot work.

Attendant: Person who observes the confined space activities/hot work to ensure that ignition of the surrounding material does not occur. The Attendant will be equipped with a fully charged, suitable fire extinguisher and/or charged fire hose at the work area at the time of the hot work. The Attendant will not be assigned to any other duties.

Confined Space: Confined spaces are spaces that can be bodily entered but are not meant for human occupancy.

Entrant: Person who is trained and authorized to enter a confined space. Entrants are required to review air-monitoring data prior to entry into a PRCS and understand the hazards.

ATTACHMENT A

CONFINED SPACE PERMIT

Posillioc Environmental, Inc.
Confined Space Entry Permit

Location of Confined Space ________________________ Date/tim ____________
Purpose of entry ________________________ Duration ____________

Authorized by ________________________ Expires on ____________
Attendant ________________________
Authorized Entrants ________________________

Measures for isolating & Equipment	**YES**	**NO**	Measures for isolating & Equipment	**YES**	**NO**
LOTO			Protective clothing		
Lines capped			Communications equipment		
Purging			Hot work permit needed		
Ventilation			Other PPE		
Secure area			Special conditions		
Harness and retrieval system					
Fire extinguishers					
Air line system					
SCBAs					
Other Respirators					

Atmospheric Monitoring

Tests to be Taken	yes	no	Acceptable entry Conditions	Test # Date: Time:	1	2	3	4	5	6	7	8	9	10
Oxygen			19.5-23.5%											
LEL			<10%											
CO			<25 ppm											
H_2S			<5 ppm											
Other														

Individual conducting test:________________________
Supervisor authorizing entry________________________

- Instruments used:

Instrument(s) name	Type	Serial #

Standby persons:________________________
Emergency and rescue contact:________________________

Entry supervisor approval to conduct entry________________________ Date/time__________

APPENDIX J

WELDING AND CUTTING SAFETY RULES

Welding and Cutting Safety Rules

1. Always follow the manufacturer's recommendations for setting up and operating equipment, selection of tip size, and gas cylinder-operating pressures.

2. Always use a regulator to reduce gas cylinder pressure to the operating pressures recommended by the equipment manufacturer. All piping and equipment must meet the standards of the Compressed Gas Association.

3. Always ensure that all connections are leak tight. Each time connections are loosened and retightened each connection should be checked with a soap and water solution (oil free soap). Do not check with a flame.

4. Before "lighting up" clear out each line by letting a small amount of gas flow (separately) to remove any mixed gases that might be in the lines.

5. Never use defective, worn or leaky equipment. Repair it or take it out of service.

6. Never use acetylene in excess of 15-psi pressure. Higher pressures with acetylene are dangerous. If the cylinder is not fitted with a hand wheel valve control, any special wrench required must be placed on the cylinder while the cylinder is in service. On manifolds, one wrench for each manifold will suffice.

7. Always have an appropriate fire extinguisher in good operating condition readily available when operating welding or cutting equipment.

8. Never perform welding, cutting, brazing, or heating operations in a poorly ventilated area. Avoid breathing fumes from these operations at all times, particularly when zinc, cadmium, or lead coated metals are involved.

9. Never perform welding or cutting operations near combustible materials (gasoline cans, paints, paper, rags, etc.).

10. Always protect yourself, others present, welding hoses, gas cylinders, and flammable materials in the area from hot slag and sparks from the welding and cutting operations.

11. The welder and spectators must always wear goggles to protect the eyes from injurious light rays, sparks and hot molten metal during welding, cutting, and heating operations. Eye protection must comply with the established ANSI Standards. Welding screens should be used wherever possible.

12. Always wear clean, oil free clothing during welding and cutting operations. Protect the hands with leather welding gloves to avoid burns from radiation and hot molten slag. Low cut shoes and trousers with cuffs or open pockets should not be worn.

13. Never use a match or cigarette lighter to light a cutting or welding torch. Always use a spark igniter. Fingers are easily burned by the igniting gas when a match or cigarette lighter is used.

14. Ensure that the material being welded or cut is secure and will not move or fall on anyone.

15. Never use a welding, cutting, or heating torch on a container that has held a flammable liquid. Explosive vapors can accumulate and linger in closed containers for extended periods of time.

16. Never use a regulator for gasses other than those for which it was designed for by the manufacturer since the diaphragm and seat materials may not be compatible with other gasses.

17. Never attempt to adapt and use a fuel gas or inert gas regulator on an oxygen cylinder. A special protective device is incorporated on the oxygen regulator to harmlessly dissipate the heat caused by the recompression when the cylinder valve is quickly opened. Such a protective device is not furnished on fuel gas and inert gas regulators.

18. Never tamper with the safety devices on cylinders, fuse plugs, safety discs, etc. and do not permit torch flames or sparks to strike the cylinder.

19. Always refer to the various gasses by their proper names. (Do not refer to oxygen as “air” or acetylene as “gas”.)

20. **All cylinders**, particularly acetylene and Oxygen, should be restrained **securely** in an upright position to prevent accidents. A non-vertical position for an acetylene cylinder in use would allow the discharge of acetone through the regulator and into the cutting torch, clogging the mixer passages and creating a fire hazard. It would reduce the efficiency of the flame and contaminate the weld area. It also can cause voids in the porous material inside the cylinder, which can lead to acetylene explosions.

21. During use, acetylene and oxygen tanks should be secured on a welding cart.

22. Store all gas cylinders not in use away from excessive heat sources, such as stoves, furnaces, radiators, the direct rays of the sun, and the presence of open flames. Cylinders in storage should always be **secured** in an upright position. Acetylene tanks will be stored at a minimum of 25 feet away from oxygen tanks.

23. Keep all burning or flammable substances away from the oxygen or fuel gas storage area (at least 20 feet) and post “No Smoking” signs.

24. Upon completion of a welding, heating, or cutting operation immediately inspect the surrounding areas for smoldering embers. Allow at least one half hour to elapse before leaving the area and conduct another thorough inspection just before leaving. Also alert other personnel of fire possibilities.

25. Always have the properly fitted wrench to fasten a regulator to a cylinder. Never tighten the regulator by hand.

26. Always leave the fuel gas cylinder valve wrench in place when the cylinder valve is open so that it can be closed quickly in an emergency. Do not open acetylene valves more than one-quarter (1/4) turn.

27. Before connecting a regulator to a gas cylinder, open the cylinder valve for a moment. Called cracking the cylinder valve, this will blow out any foreign material that may have lodged in the valve during transit. Do not stand in front of the valve when “cracking”.

28. After attaching a regulator to a gas cylinder, be sure the regulator adjusting screw is fully released (backed off in a counter clockwise direction so that it swivels freely) before the cylinder valve is opened. Never stand in front of a regulator when you are opening a cylinder valve.

29. Always open the cylinder valve slowly so that gas pressure will build up slowly in the regulator (particularly in the oxygen cylinder). Quick opening of the cylinder valve causes a buildup of heat due to recompression of the gas. When combined with combustible materials, ignition and explosion may result.

30. If a leak develops in a fuel gas cylinder that cannot be stopped by closing the valve, immediately place the cylinder outside of the building away from possible fire or ignition sources in a location that is free from wind currents that might carry the gas to an ignition source.

31. Never attempt to mix gasses in a cylinder or fill an empty one from another (particularly oxygen cylinders). Mixture of incompatible gasses and/or heat caused by recompression of the gas or gasses may result in ignition and fire. Only the owner of a cylinder may mix gasses in it.

32. When a gas cylinder is ready for return to the supplier, be certain the cylinder valve is closed to prevent internal contamination and the shipping cap is in place to protect the cylinder valve. Identify empty cylinders properly.

33. Never use oxygen or other gasses as a substitute for compressed air in operation of air-operated tools, blowing off parts, or for ventilation purposes. The only exception to this rule is where oxygen is used to blow out port passages and talcum powder or dust from welding hoses when setting up new or old “dusty” equipment.

34. Do not attempt to do your own repair on welding equipment. Equipment that is improperly repaired can cause leaks and other hazardous conditions. Qualified repair personnel must perform repairs.

35. Never repair welding hose with tape. Use of tape and many hose splices can reduce the pressure to the torch and can cause hazardous conditions. Welding hose must meet the specifications of the Compressed Gas Association.

36. Use the shortest length of hose possible. Longer hoses require higher gas pressures and can be hard to handle.

37. Never use oil or grease on any part of welding or cutting equipment and never let it come into contact with oil or grease. This includes gas cylinders, workbench, regulators, torches, tips, threads on bottles, and clothes that are worn, such as jackets, gloves, and aprons. Oxygen and oil or grease can cause explosions and fire.

38. Never use a hammer on the valve cover caps to loosen them. Use a piece of wood to soften the impact and prevent sparks and damage to the cap.

39. When moving gas cylinders always roll them on their bottom edges or in a cart designed for their movement. Sliding or dragging them or rolling causes excessive wear and may weaken their walls by metal erosion. Slings and electromagnets are not authorized when transporting cylinders.

40. Never use cylinders as rollers to move material. Do not let them bump into each other or let them fall.

41. Fuel gas and liquefied fuels must be stored and shipped valve end up.

42. Do not hammer on any cylinder. Do not tamper with the relief valves. If you have trouble, contact the supplier for assistance.

43. Suitable eye protection must be worn for all welding and cutting operations.

44. Cylinders must be secured. Valves must be closed when unattended and caps must be on the cylinders when the regulators are not on the cylinders.

45. Cylinders must be upright when they are transported in powered vehicles.

46. All cylinders with a water weight of over 30 lbs. must have caps or other protection.

47. All fuel gases must be used through a regulator on cylinder or manifold.

48. Compressed gas cylinders must be upright except for short periods for transportation.

49. Repair work on gauges and regulators must be done by qualified personnel.

50. Only 4 inches of hose per foot may be covered with tape. Defective hoses must be removed from service.

51. Oxygen must not be used for ventilation.

52. Oxygen regulators must be marked “Use No Oil”. Regulators and fittings must meet the specifications of the Compressed Gas Association.

53. Union nuts on regulators must be checked for damage.

54. Before removing a regulator, shut off cylinder valve and release gas from regulator. Equipment must be used only as approved by the manufacturer.

55. Caps must be on cylinders unless they are transported on a special carrier.

56. Hot warnings on materials are required.

57. Fire is the biggest hazard in welding. The area should be cleared for a radius of 35 feet. Fire shields should be used. The area should be monitored for 30 minutes or more after end of work to ensure there is no delayed ignition.

58. Proper personal protective equipment must be worn by all welders and assisting personnel.

59. All welding personnel should be advised of the hazards from heating zinc, lead, cadmium, and any other substances that could cause health problems from the welding activity.

(The following apply to arc welding)

60. Chains, wire ropes, hoists, and elevators must not be used to carry welding current.

61. Leather capes should be used for overhead welding.

62. The neck and ears must be protected from the arc.

63. Conduits with electrical conductors in them must not be used to complete a welding circuit.

64. Welding shields must be used to protect other workers from injurious light rays.

65. Welding leads must be inspected regularly for damage to insulation. Only proper splicing will be authorized. There should be no splices in stinger lead within 10 feet of the stinger and the leads should never be wrapped around the body.

66. A designated, competent person must inspect welding equipment and gas cylinders.

67. Output lugs on welders require the protective boots to be in place.

APPENDIX K

PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM

PERSONAL PROTECTIVE EQUIPMENT (PPE) PROGRAM: SELECTION AND USE

Purpose

This program has been written to help the worker choose the correct Personal Protective Equipment (PPE) for the job. Familiarity with the different levels of protection (A, B, C and D) will help speed up the selection process. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing. Posillico employees may work at a variety of job sites and locations which may require different types of protective equipment. Client specific requirements will always be adhered to. Posillico will supply all PPE or reimburse the employee for the costs of PPE if the PPE is required as part of the project.

Scope

This program establishes criteria for the selection, use, donning and doffing, inspection, maintenance, storage, decontamination of PPE, and evaluation. This information is general, and specific PPE use should be included in the site-specific health and safety plan (SSHSP) prepared for each project.

OSHA Requirements (29 CFR 1910.120)

A written personal protective equipment program, which is part of the employer's safety and health program and also part of the site-specific health and safety plan, shall be established. The PPE program shall address the elements listed below.

- PPE selection based upon site hazards;
- PPE use and limitations of the equipment;
- Work mission duration;
- PPE Maintenance and storage;
- PPE decontamination and disposal;
- PPE training and proper fitting;
- PPE donning and doffing procedures;
- PPE inspection procedures prior to, during and after use;
- Evaluation of the effectiveness of the PPE program; and
- Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

OSHA Standard 29 CFR 1910.132 requires employers to assess the employer's workplace and determine if hazards are present that necessitate the use of personal protective equipment (PPE). This assessment must be certified in writing and documented.

Due to the variety of job sites and situations that Posillico personnel may be involved in, it is important that Posillico maintain a consistent approach in complying with health and safety procedures. The project manager and/or site supervisor are responsible for ensuring that all personnel wear the appropriate PPE. Failure to comply with these requirements may result in disciplinary action. Employee safety is a paramount concern for all Posillico managers and employees. We all must make every effort to protect ourselves and each other from harm. These procedures will now require the following:

1. Protective footwear must be worn by all field personnel working in the field. Footwear must at a minimum include steel toe and shank protection. Protective footwear must meet ANSI Z41-1991. Additionally, chemical protective footwear may also be required if the potential for contaminated materials exists. This type of protection will be required on a site-specific basis.

2. Eye protection must be worn by all personnel, subcontractors and visitors at all times. Eye protection should be in place as the job site is entered and remain on until the work area is exited. Eye protection does not have to be work inside enclosed cabs, automobiles or job trailers. Eye protection must include side shields. Prescription lenses worn as eye protection and other protective eyewear must meet ANSI Z87.1.

3. Hardhats are to be worn by all field personnel when in the field. New hardhats must meet ANSI Z89.

4. Hi-visibility ANSI II approved Vests are to be worn at all times. Vests should be closed in front and back.

5. Hand protection is to be worn on a site-specific basis. The hand protection must be selected based on the chemical hazards expected to be encountered. Posillico maintains a stock of a variety of gloves including:

   Best: Nitrile N-Dey
   PVC
   Latex
   Vinyl
   Solvex, Nitrile
   Leather Work Gloves

   Additionally, nitrile coated Kevlar gloves or other types of puncture resistant gloves are to be worn by all personnel working with or cleaning glass impingers. Manufacturers that supply these gloves include Ansell Edmont, Jomac and Wells Lamont. Insulated electrical gloves with outer leather gloves is required when working around high-voltage systems.

   Posillico is responsible for supplying all personal protective equipment required for Posillico's projects

Work Mission Duration

Before donning any PPE ensembles, workers will estimate their anticipated work duration. There are several limiting factors that affect the length of work time. These factors must be addressed:

- Air supply consumption
- Permeation and penetration of the Chemical Protective Clothing/ensemble;
- Ambient temperature; and
- Coolant supply (ice or chilled area to keep the worker's body temperature at a normal temperature).

Level of Protection

The following section describes the different levels of protection (A through D). Each level is described in the following manner: the protection provided; when this particular level of protection should be used; recommended and optional equipment; and, any limiting criteria.

1. Level A

   a. Protection provided:

      - Level A provides the highest available level of respiratory, skin and eye protection.

   b. Should be used when:

      - The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on any of the following circumstances;

      - Measured (or potential for) high concentration of atmospheric vapors, gases or particulates;

      - Site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases or particulates of materials that are harmful to skin or capable of being absorbed through intact skin;

      - Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible;

      - The Operations must be conducted in confined, poorly ventilated areas until absence of conditions requiring Level A protection is determined.

   c. Recommended equipment:

      - Pressure-demand, full facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA;

- Fully-encapsulating, chemical-resistant suit (pressure-tested immediately before use);

- Inner chemical-resistant suit;

- Inner chemical-resistant gloves;

- Chemical-resistant safety boots/shoes; and

- Two-way radio communications.

d. Optional equipment:

- Cooling unit;
- Coveralls;
- Long cotton underwear;
- Hard hat; and
- Disposable gloves and boot covers.

e. Limiting criteria:

- Fully encapsulating suit material must be compatible with the substances involved.

2. Level B

a. Protection provided:

- The same level of respiratory protection, but less skin protection than Level A.

b. Should be used when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard, or that do not meet the criteria for use of air purifying respirators;

- Atmospheres contain less than 19.5% oxygen; and

- Presence of incompletely identified vapors or gases indicated by direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

c. Recommended equipment:

- Pressure-demand, full facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA;

- Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit);

- Inner and outer chemical-resistant gloves;

- Chemical-resistant safety boots/shoes;

- Hard hat; and

- Two-way radio communications.

d. Optional equipment:

- Coveralls;
- Disposable boot covers;
- Face shield; and
- Long cotton underwear.

e. Limiting criteria:

- Use only when the vapors or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through the intact skin.

- Use only when it is highly unlikely that the work being done will generate either high concentrations of vapors, gases or splashes of material that will affect the exposed skin.

3. Level C

a. Protection provided:

- Level C provides the same level of skin protection as Level B, but a lower level of respiratory protection.

b. Should be used when:

- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin;

- The types of air contaminants have been identified, concentrations measured, and a canister/ cartridge is available that can remove the contaminant; and

- All criteria for the use of air-purifying respirators are met.

c. Recommended equipment:

- Full facepiece or half facepiece air-purifying negative pressure respirator;
- Chemical-resistant clothing;
- Inner and outer chemical-resistant gloves;

- Chemical-resistant safety boots and shoes;
- Disposable boot covers;
- Hard hat; and
- Two-way radio communications.

d. Optional equipment:

- Coveralls;
- Face shield;
- Escape bottle; and
- Long cotton underwear.

e. Limiting criteria:

- Atmospheric concentration of chemicals must not exceed IDLH levels; and
- The atmosphere must contain at least 19.5% oxygen.

4. Level D

a. Protection provided:

- No respirator protection and minimal skin protection.

b. Should be used when:

- The atmosphere contains no known hazard; and
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

c. Recommended equipment:

- Coveralls;
- Safety boots/shoes;
- Safety glasses or chemical splash goggles; and
- Hardhat.

d. Optional equipment:

- Gloves;
- Escape bottle; and
- Face shield.

e. Limiting criteria:

- This level should not be worn in the exclusion zone; and
- The atmosphere must contain at least 19.5% oxygen.

Level of Protection Utilized

Due to the nature of our work, it can be reasonably expected that personnel will not be performing any work that will require the use of Level A protection. Posillico will not directly undertake assignments and Posillico does not generally train or equip its personnel to handle circumstances involving Level A protection. If Posillico is working on a site and Level A is deemed necessary, the work will be subcontracted to a qualified firm. Posillico personnel should not directly undertake these tasks.

Sites where Posillico is working often require the use of Level C or D, with Level B equipment available on-site for emergency rescue. Any questions concerning the level of protection necessary to complete a certain task will be directed to the Health and Safety Assessment Division before setting up the job.

Types of PPE to be Potentially Utilized by Posillico

The following list contains types of PPE utilized by Posillico and their uses on the job, as they may apply to a specific site.

1. Respiratory Equipment:

   a. SCBAs:

      - Used for emergency rescue and exposures greater than maximum use concentration limits set for canister/cartridge type negative pressure respirators.

   b. Supplied-air respirators:

      - MSA Premaire system.

   c. Negative pressure respirators:

      - Half face and full face, used for exposure to certain types of acid gases, organic vapors and particulates not greater than the canister/cartridge maximum use concentration limit.

2. Chemical protective apparel suits:

   a. Polycoated Tyvek, Saranex, Chemrel and Tyvek (porous). Provide protection against certain liquid chemicals.

      - Tyvek provides protection against particulates only.

   b. Fire/flame retardant coveralls:

      - Provide protection against flash fires.

3. Insulated clothing (Provides protection against exposure to the cold:

   a. Chemical resistant gloves:

      - Provide protection for the hands against chemical splashes.

   b. Disposable boot covers:

      - Protect safety boots from contamination and feet from contact with chemicals.

4. Eye protection:

   a. Safety glasses and chemical splash goggles.

      - Safety glasses protect the eyes against large particles and projectiles.
      - Chemical splash goggles protect the eyes against vaporized chemicals, splashes, large particles, and projectiles.

   b. Vented goggles do not provide protection against vapors and are not adequate for splashes, as material may seep inside the goggles.

5. Hard hat:

   a. Provides protection against blows to the head. When worn with a liner, provides protection against the cold.

6. Construction safety boots:

   a. Steel-toe and shank construction boots with chemically resistant soles protect the feet from heavy and sharp objects, and contact with chemicals.

7. Safety harnesses and lifelines:

   a. Enable the individual to work in elevated areas or enter confined spaces to prevent falls and aid in rescue.

8. Hearing protection:

   a. Provides protection against physiological damage and psychological effects.

9. Canvas work gloves:

   a. Provide protection for the hands against abrasions and slivers.

Selection of Chemically Protective Clothing

1. Chemically-protective clothing (CPC) will be chosen in the following manner:

   a. Determine what chemicals are present on the site.

b. CPC chosen must be resistant to permeation, degradation and penetration of the chemical(s).

- Permeation - Process by which a chemical dissolves in and/or moves through a protective clothing material on a molecular level.

- Degradation - The loss of or change in the fabric's chemical resistance or physical properties due to exposure to chemicals, use or ambient conditions (e.g., sunlight).

- Penetration - The movement of chemicals through zippers, stitched seams or imperfections (e.g., pinholes) in CPC.

c. c. Review manufacturer's permeation data to determine the performance characteristics of the material to the specific chemical.

d. d. Select CPC that protects against the greatest range of chemicals on the site and has the longest breakthrough time.

e. e. Discuss choice of CPC with the Health and Safety division prior to setting up the job.

Donning and Doffing Procedures

The following procedures will be used by Posillico employees and Posillico subcontractors for donning and doffing PPE at protection Levels B and C. Donning and doffing will be performed with the assistance of an individual(s) located in the Support Zone and Contamination Reduction Zone, respectively. This individual will help the worker tape up and adjust PPE for proper fit, as well as remove PPE after decontamination.

1. Donning PPE

   a. Inspect the clothing and respirator before donning.

   b. Unzip the suit.

   c. Step into the legs of the suit, slipping the feet through the legs. Push arms through the sleeves.

   d. Pull leg cuffs over the feet.

   e. Put on chemical-resistant safety boots over the feet. Tape the leg cuff over the tops of the boots.

   f. Pull over chemical-resistant boot covers and tape over the leg cuff.

   g. If suit contains protective feet, wear chemical-resistant safety boots inside the suit with chemical-resistant boot covers over the suit and taped securely to the leg.

h. If wearing a SCBA, don the facepiece and adjust it to be secure, but comfortable. Do not connect the breathing hose. Open valve on the air tank.

i. If wearing a negative pressure respirator, pull hood over the head and perform positive and negative pressure facepiece seal test (procedures are written in the Posillico's Respiratory Protection Program).

j. Pull on chemical protective inner gloves.

k. Pull on chemical protective outer gloves and tape securely to the sleeve of the suit.

l. Securely tape the suit to protect all exposed skin around the neck area, and if wearing a full facepiece, tape around the edge of the hood-to-facepiece junction.

m. Put on hardhat, if needed, and tape securely on top of head so that the hard hat does not slide off.

2. Doffing PPE

a. Doffing of PPE will not take place until the individual has been properly decontaminated by a suitably attired assistant. Both the worker and assistant will make every effort to avoid any direct contact with the outside of the suit.

b. If the individual is wearing a SCBA, the hose connection to the diaphragm will be disconnected, leaving the facepiece on the wearer. The remainder of the unit will be removed and decontaminated before proceeding further.

c. If the individual is wearing a half-face or full-face negative pressure respirator, she/he will be instructed to leave it on until the doffing procedure is complete.

NOTE: Decontamination is to be performed in accordance with the Site-Specific Health and Safety Plan for the site.

Decontamination of PPE

Whenever possible, disposable PPE will be used on-site. Disposable PPE includes the following:

- Chemical protective suits;
- Gloves; and
- Chemical protective boot covers.

After decontaminating the worker, PPE is disposed of on-site in labeled disposal containers. Complete procedures for the decontamination, cleaning, inspection, maintenance and storage of respiratory equipment is covered under Posillico's Respiratory Protection Program. All PPE must be cleaned and properly stored. If Posillico-owned PPE cannot be cleaned or disinfected or is damaged it will be replaced by Posillico.

Inspection of PPE

PPE will be inspected prior to, during and after each use according to the procedure outlined below.

1. Prior to use (Reusable and Disposable PPE):

   a. Through reviewing available literature, determine that the clothing material is correct for the task.

   b. Visually inspect for:

      - Imperfect seams;
      - Non-uniform coatings;
      - Tears or holes; and
      - Malfunctioning closures.

   c. Hold up to the light and check for pinholes (inflate gloves and check for leaks).

   d. Flex and check for:

      - Cracks; and
      - Shelf deterioration.

   e. If previously used, check for:

      - Discoloration;
      - Swelling;
      - Stiffness and cracking; and
      - Holes and tears.

2. During use (Reusable and Disposable PPE), check for:

   a. Evidence of chemical attack.
   b. Discoloration, swelling, stiffening, softening and/or cracking.
   c. Tears.
   d. Punctures.
   e. Seam discontinuities.

Note: Report any sense of breakthrough to the Health and Safety Assessment Division. Medical monitoring may be necessary to determine the extent of exposure.

3. After use (Reusable PPE), check for:

   a. Malfunctioning parts.
   b. Evidence of chemical attack.
   c. Punctures.
   d. Tears.
   e. Cracks.

Note: Posillico's Respirator Protection Program addresses complete inspection procedures and will be consulted for inspection of all respiratory equipment.

Maintenance and Storage of PPE

PPE, other than respiratory equipment (covered under Posillico's Respiratory Protection Program), will be maintained and stored in accordance with the manufacturer's recommendations at a minimum to prevent damage due to exposure to dust, moisture, sunlight, chemicals, temperature extremes and sudden impact.

PPE will be stored in Field Operations Equipment bags. Before and after each use, the PPE will be inspected to determine whether or not it is still "field worthy". Any PPE found to be defective will be reported to the Health and Safety Assessment Division and either discarded or repaired, as appropriate. Under no circumstances will defective PPE be used in the field.

1. The Health and Safety Assessment Division will periodically inspect PPE issued for individual use.

    a. Unless the equipment can be repaired, any PPE found to be defective will be removed from service and discarded immediately.

    b. Repairable PPE will be tagged, returned to the Facility Manager and sent out for repair.

Training

Posillico will provide the proper equipment to employees and train them on the proper use. At a minimum, each employee using PPE must know:

- When PPE is necessary
- What PPE is necessary and which PPE has been selected for each process the employee operates
- How to properly put on, take off, adjust and wear PPE
- The limitations of PPE
- How to determine if PPE is no longer effective or is damaged
- How to get replacement PPE
- How to properly care for, maintain, store and dispose of PPE

After employees have been trained, periodic assessment of the process/equipment will be conducted ensure that the PPE is adequate and training is appropriate.

Retraining employees will occur whenever:

- Changes in the workplace render the previous training obsolete
- Changes in the type of PPE render previous training obsolete
- Employer observed inadequacies in an employee’s knowledge or use of assigned PPE indicates that an employee has not retained the necessary understanding or skill

Posillico verifies that each employee who is required to use PPE has received and understood the required training. Training is confirmed by written certification which included the employee name, the dates of training, and the certification subject.

Evaluation Of PPE Program

Posillico's Personal Protection Equipment Program will be reviewed annually by the Health and Safety Assessment Division. Any program deficiencies that are identified by a Posillico employee will be reported to the Health and Safety Assessment Division, so that changes will be made immediately. All employees affected by the change(s) will be notified in writing.

Review of the PPE Program will include, but not be limited to, the following:

- Accident and illness experience on various job sites.
- Type and degree of exposure.
- Adequacy of equipment selection process.
- Degree of fulfillment of program objectives.
- Employee acceptance.
- Coordination with overall health and safety program elements.
- Recommendations for program improvements and modifications.
- Adequacy of program records.

Employee Owned Equipment

Posillico does not allow the use of employee-owned equipment on job sites.

APPENDIX L

RESPIRATORY PROTECTION PROGRAM

Purpose:

The purpose of the Respirator Program is to ensure that all employees are protected from exposure to respiratory hazards. Engineering controls such as ventilation and substitution of less toxic materials are the first line of defense. However, engineering controls are not feasible for some operations or do not completely control the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also utilized for protection during emergencies.

Procedure:

This program applies to all employees who are required to wear respirators during normal work operations and during certain non-routine or emergency operations. Employees participating in the respiratory protection program do so at no cost to them. The expense associated with medical evaluations, training, and respiratory protection equipment will be borne by the company.

- Respirator equipment is required in areas where health hazards may exist due to accumulations of dusts, fumes, mists or vapors. If your job requires the use of a respirator see your supervisor for training and the proper respirator for the working conditions at hand.

Employees who voluntarily choose to use a cartridge style respirator when the respirator is not required are subject to the medical evaluation, cleaning, maintenance, and storage elements only of this program. These individuals will also receive training covering proper procedures for cleaning, maintenance and storage of their respirators.

Posillico has a full written Respiratory Program as listed below.

Respiratory Protection

Purpose

The purpose of this program is to establish, implement and maintain an appropriate Respiratory Protection Program to protect employees from respiratory hazards on our jobsites. Respiratory Protection is an area of Safety and Health that Posillico Inc. takes extremely seriously.

Through education and training, we believe that working in and around respiratory hazards and environments can be managed safely and effectively. As a company, we believe in engineering out or administratively controlling respiratory hazards and environments. When these controls cannot be instituted, we will use appropriate respiratory protection. Posillico Inc. shall ensure that respiratory hazards within our sites are evaluated and that information concerning these hazards is transmitted to all affected employees through our construction planning process.

Applicable Regulations

OSHA 29 CFR 1910.134

Responsibilities

The Posillico Safety Director is responsible for respiratory protection program and has the authority to make necessary decisions to ensure its implementation and maintenance. The Safety Director has the authorization to halt any company operation where there is danger of serious personal injury or unnecessary exposure;

A corporate respiratory program administrator shall be appointed and shall approve all site specific respiratory programs prior to implementation at the site, and thereafter review as required;

The program shall be reviewed and evaluated on an annual basis, or when changes occur to 29 CFR 1910.134, that prompt revision of this document or when facility operational changes occur that require a revision to the program;
The corporate respiratory program administrator shall conduct routine evaluations to ensure the written program is being followed. Topics to be considered during the evaluation shall consist of: respirator fit, selection, maintenance, interference with job performance, discomfort, employee concerns; and

Provide a database of Medical Evaluation Questionnaire and Fit Test results of each employee required to wear respiratory protection.

Project Management shall:

Evaluate work activities for the presence of respiratory hazards and prepare construction plans for each activity;

Institute engineering and administrative controls, as a first line of defense against respiratory hazards;

Shall appoint a qualified individual to be the Site Respiratory Program Administrator who shall prepare the **Work Site Respiratory Programs** (WSRP) for each substantially unique airborne exposure at the jobsite. The Site Respiratory Program Administrator shall submit the WSRP(s) to the Corporate Respiratory Program Administrator for approval before the use of respirators begins. And shall ensure the successful implementation of the WSRP(S) on the jobsite;

Purchase suitable, effective, respirators to protect employees from respiratory hazards;
Ensure each employee wearing respiratory protection has the required medical clearance and fit test record prior to wearing the respirator;

Train employees in topics identified in this program; and

Effectively enforce the use of respirators.

Employees shall:

Correctly wear respirators in accordance with instructions and training during operations designated by their supervisor;

Not have facial hair of any type that interferes with the correct fit of a respirator;

Properly clean, store and maintain respirators according to the direction of the manufacturer or their supervisor; and

Guard against damage to the respirator and shall immediately replace suspect respirators and shall report such damage or malfunction of the respirator to their supervisor.

Procedure

Site-Specific Respiratory Protection Program

In addition to meeting the requirements of this program, all projects that use respirators will be required to have a site-specific respiratory protection program;

In order to have an effective program, address the following questions in the development stage:

- Who is the program administrator?
- What procedures are used to select respirators for use in the workplace?
- Who will be doing the medical evaluations for the employees (which facility or facilities)?
- What are the fit testing procedures for tight fitting respirators?
- What are the procedures for proper use of respirators in normal and foreseeable emergencies?
- What are the procedures and schedules for cleaning, disinfecting, storing, inspection, repairing, discarding and otherwise maintaining respirators?
- What are the procedures to ensure adequate air quality, quantity and flow of breathing for atmosphere supplying respirators?
- What are the methods to be used to ensure that the employees are trained the in respiratory hazards to which they are potentially exposed during routine and emergency situations?
- What are the methods of training employees in the proper use of respirators including, donning and removing a respirator, cleaning, positive/negative pressure fit testing, limitations of their use and maintenance and cleaning of a respirator?
- What are the procedures of regularly evaluating the effectiveness of a program?
- When respirator use is not required, but are provided at the request of the employees or permit employees to use their own respirators, the following criteria will be met:
  - Determine that such respirator use does not create a hazard;
  - Review 29 CFR 1926.134; and
  - Training on cleaning, storage and maintenance of the respirator to prevent it from being a hazard.

Surveillance of Work Area Conditions

As each activity progresses, surveillance of work area conditions and degree of employee exposure or stress shall be monitored and measured;

The site Safety Representative will make a reasonable estimate of employee exposure by conducting a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency.

The evaluation may include:

- Identification and review of a list of hazardous substances used in the work area;
- Review of work processes to determine source of potential hazardous substances;
- Review of process records;
- Employee interviews;
- Air Monitoring (may be mandatory if the contaminant is regulated by a separate OSHA Standard e.g. Asbestos, Lead, Silica, Methylene chloride, etc.);
- Published studies by safety associations, manufacturers, historical data;
- Mathematical approaches using physical & chemical properties of the contaminant;
- If a reasonable estimate cannot be obtained then IDLH atmosphere must be assumed; and
- The site Safety Representative will revise and update the hazard assessment as needed.

Air Sampling will be conducted as per the requirements in this section.

Air Sampling Procedure

Baseline sampling shall commence at the beginning of each operation, which is identified as a potential for airborne exposure. Historical data from similar operations producing airborne exposure can be used as baseline exposure monitoring, when feasible, but must be evaluated according to activity, length of operation, conditions in which the samples were taken, etc;
Personal air sampling shall always be the first method to determining actual employee exposure. Area monitoring shall be used to supplement personal air sampling but shall not be the only method of determining exposure;

Air Sampling will be representative of the exposure that the employee is exposed to throughout his daily shift;

An Air Monitoring Worksheet shall be completed for each sample taken on any given day. If several different samples are taken on the same day then one Air Monitoring Worksheet can be filled out providing the conditions for each employee are the same, otherwise a separate worksheet is required;

A Chain of Custody will be completed for each batch of samples that are to be sent to the Laboratory for analysis, along with the Air Monitoring Worksheet. Both these documents are to remain with analysis received back from the Laboratory;

If the initial baseline results demonstrates employee exposure to be below the action level, then; Personal and Area Air Sampling will take place thereafter on at least three consecutive measurements taken at least seven (7) days apart;

Air Sampling Frequency

Results will be dealt with as follows:

- Where results demonstrate that the employee exposure is below the action level, monitoring shall be continued until sampling shows no exposure on at least three consecutive measurements taken at least seven (7) days apart;
- Where results demonstrate that the employee exposure is above the action level, but below the permissible exposure limit, monitoring shall be repeated at least every 6 months. The monitoring shall continue until at least two consecutive measurements, taken at least 7 days apart, are below the action level, at which time the monitoring for that employee or operation may be discontinued; and
- If the initial monitoring reveals that employee exposure is above the permissible exposure limit, the monitoring shall be repeated quarterly. The monitoring shall continue until at least two consecutive measurements, taken at least 7 days apart, are below the permissible exposure level, at which time the monitoring for that employee or operation may be discontinued.

Whenever there has been a production, process, control or personnel change which may result in new or additional exposure to any contaminant, or whenever Posillico Inc. has any reason to suspect a change which may result in new or additional exposures, additional monitoring shall be conducted; and

The Corporate Respiratory Program Administrator shall supervise air monitoring results and exposure assessment.

Medical Evaluation

Persons shall not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and effectively use the equipment;

The Corporate approved physician(s) will be used in all instances for medical evaluate and clearance for respirator use;

Prior to work commencing, each required employee shall complete a **Medical Evaluation Questionnaire (MEQ)** in accordance with CFR 1910.134. This shall be sent to the approved physician for clearance;

The examining physician will then evaluate the employee, based on their answers, and certify clearance for respirator use under any conditions that they see fit. This may involve clearance by MEQ alone, consultation with the Physician and/or a medical examination;

This clearance will be forwarded to the Corporate Respiratory Program Administrator and the Site Respiratory Program Administrator for processing and record keeping. Any conditions stated on the clearance will be followed; and

Additional medical evaluations shall be provided when:

- An employee has any change in medical status;
- An employee reports medical signs or symptoms that are related to ability to use a respirator; and
- The physician states that the employee needs to be re-evaluated.

Fit Test Procedure

The procedures in Appendix A in section 29 CFR 1926.103 are to be followed. A medical evaluation needs to be completed prior to fit testing an employee;

Fit testing will be performed using Quantitative Fit Testing measures. If this is not available, then qualitative means may be used until the quantitative means are available;

Select respirators from a sufficient number of respirator models and sizes to assure that the respirator is acceptable to, and correctly fits, the user;

Fit tests will be done before using the respirator in the field and will be repeated annually, when a different type or brand of respirator is worn or when there is a significant physical difference in the employee such as body weight, facial scarring, dentures, broken jaw;

The absence of one or both dentures can seriously affect the fit of a face piece. The worker's diligence in observing these factors shall be evaluated by periodic checks;

To assure proper protection, each wearer will complete positive and negative checks to ensure seal;

Hair. Fit testing shall not be conducted if there is any hair growth between the skin and the facepiece seal surface.

Respiratory Difficulty during Tests. If an employee exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties;

Respirator Use Determination. The test subject shall be given the opportunity to wear the assigned respirator for one week. If the respirator does not provide a satisfactory fit during actual use, the test subject may request another fit test, which shall be performed immediately;

Filter Replacement. Filters used for qualitative or quantitative fit testing shall be replaced weekly, whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media. Organic vapor cartridges/canisters shall be replaced daily or sooner if there is any indication of breakthrough by the test agent.

Because the sealing of the respirator may be affected, quantitative fit testing shall be repeated immediately when the test subject has a:

- Weight change of 20 pounds or more;
- Significant facial scarring in the area of the facepiece seal;

- Significant dental changes; i.e., multiple extractions without prosthesis, or acquiring dentures;
- Reconstructive or cosmetic surgery; and
- Any other condition that may interfere with the facepiece seal.

Fit Test Record keeping Requirements. A summary of all test results shall be maintained for 3 years. The summary shall as minimum include:

- Name of test subject;
- Date of testing;
- Name of the test conductor; and
- Fit factors obtained from every respirator tested (indicate manufacturer, model, size and approval number).

Selection of Respirators

Dust masks are not permitted for use as a respirator on any project under any circumstances;

The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it is designed;

All filter cartridges and canisters shall be labeled with the appropriate NIOSH approval label that has been certified under the NIOSH 42 CFR Part 84. This label is not to be removed, obscured, or defaced while in service. Only series 100 filters certified under 42 CFR Part 84 shall be used when HEPA filters are called for;

Gas or Vapor protection – If a respirator with an End of Service Life Indicator (ESLI) is not available; a change-out schedule will be specified on a site-specific basis. Every effort will be made to obtain objective information and data to assure that the cartridges are changed out prior to end of service life;

Respirators will be selected based on the specific hazard involved and shall be selected in accordance with the manufacturer's instructions or other related requirements (OSHA or ANSI Standards, NIOSH, etc.). The criteria specified in the following table shall be used:

Hazard	Respirator*
Oxygen Deficiency	Self-contained breathing apparatus. Hose mask with blower. Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Gas & Vapor (Contaminants immediately dangerous to life and health)	Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Gas & Vapor (Contaminants NOT immediately dangerous to life and health)	Airline respirator. Hose mask without blower. Air purifying half-mask or mouthpiece respirator with chemical cartridge.
Particulate Contaminants (Contaminants immediately dangerous to life and health)	Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Particulate Contaminants (Contaminants NOT immediately dangerous to life and health)	Air-purifying half-mask or mouthpiece respirators with filter pad or cartridge. Airline respirator. Airline abrasive-blasting respirator. Hose mask without blower.
Combination Gas, Vapor & Particulate (Contaminants immediately dangerous to life and health)	Self-contained breathing apparatus. Hose mask with blower. Air purifying full-face piece respirator with chemical canister (gas mask with filter). Self rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Combination Gas, Vapor & Particulate (Contaminants NOT immediately dangerous to life and health)	Airline respirator. Hose mask without blower. Air purifying half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.

* For the purpose of this part, “Immediately Dangerous to Life and Heath”, (IDLH), is defined as a condition that either poses an immediate threat to life and health or an immediate threat of severe exposure to contaminants, such as radioactive materials, which are likely to have adverse delayed effects on health.

Use of Respirators

The correct respirator shall be specified for each job, the respirator type shall be specified in the site specific respiratory plan, by the Site Safety Representative or designated individual, who supervises the respiratory protection program. This shall be specified through each and every Construction Plan.

Each employee will be assigned his or her own respirator. Sharing respirators is not permitted.

Dangerous Atmospheres. Written procedures and/or checklists for specific routine tasks/jobs shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies:

- In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least on additional person shall be present. Communications (visual, voice, or signal line) shall be maintained between both individuals present. Planning shall be such that one individual shall be unaffected by any likely incident and have the proper rescue equipment to be able to assist other(s) in case of an emergency; and
- When a self-contained breathing apparatus (SCBA) or hose masks with blowers are used in atmospheres immediately dangerous to life or health (IDLH), standby personnel must be present with suitable rescue equipment.

Respirators shall not be removed while inside a work area that requires respiratory protection. Employees shall be permitted to leave the work area to maintain, clean, change filters, replace parts, or to inspect their respirator if it is impeding their ability to work or if the respirator stops functioning as intended. Employees shall notify supervisor of when leaving the work area.

To assure the continuing respirator effectiveness, appropriate surveillance shall be maintained of the work area conditions and the degree of employee exposure or stress. This shall include a fit check evaluation to assure proper protection. The Site Safety Representative shall accomplish this.

Hair / Apparel. If hair growth or apparel interferes with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit before the worker is allowed to proceed with work utilizing a respirator;

Corrective Vision. If an employee wears corrective glasses or goggles or other personal protective equipment. A check shall be made to ensure that such equipment when worn does not interfere with the seal of the face piece to the face of the user. If the employees wear other safety equipment with their respirators, the employee must pass an appropriate fit test while wearing the equipment to determine a correct seal.

Corrective vision requirements (Full-Face Respirators). Full-Face respirators having provisions for optical inserts shall be reviewed. These inserts when used shall be used according to the manufacturer's specification. The face piece and lenses shall be fitted by qualified individuals to provide good vision, comfort and a satisfactory face seal.

Conventional eyeglasses shall not be used with full-face respirators. A proper seal cannot be established if the temple bars of eyeglasses extend through the sealing edge of the full face piece.

Contact lenses shall not be used with full-face respirators. Wearing contact lenses in contaminated atmospheres with a respirator shall not be allowed.

Identification of chemical cartridges is by means of its label. The secondary means is by color code. All cartridges purchased or used shall be properly labeled and/or color-coded in accordance with 29 CFR 1910.134 before they are placed into service. The labels and colors shall be properly maintained at all times until disposal.

Color-coding. Each cartridge is painted a distinctive color or combination of colors indicated in Table 1-1 below. All colors used are such that they are clearly identifiable by the user and clearly distinguishable from one another.

TABLE I-1 from 29 CFR 1910.134

ATMOSPHERIC CONTAMINANT(S)	COLOR(S) ASSIGNED
Organic vapors	BLACK
Acid gases	WHITE
Organic vapors/acid gases	YES
Ammonia/methylamine	GREEN
Multi-gases/vapors	OLIVE
P100 particulate	MAGENTA
Organic vapors/P100	MAGENTA & BLACK
Acid gases/P100	MAGENTA & WHITE
Organic vapors/acid gases/P100	MAGENTA & YELLOW
Ammonia/methylamine/P100	GREEN
Multi-gases/vapors/P100	MAGENTA & OLIVE

NOTE: GRAY is not assigned as the main color for a canister designed to remove acids or vapors.
NOTE: ORANGE is used as a complete body or stripe color to represent gases not included in this table. The user shall need to refer to the canister label to determine the degree of protection the canister shall afford.

Identification of Particulate Filters

The 42 CFR Part 84 standards create three new series of particulate filters ("disposable") designated by NIOSH as **N, R,** and **P**. The N series is tested against sodium chloride (NaCl) and is limited to use in atmospheres containing non-oil based particulates. Both the R and P series are tested against dioctyl phthalate (DOP) and are intended for filtering any solid or oil-based liquid particulates.

FILTER SERIES	FILTER TYPE DESIGNATION	MINIMUM EEFICENCY
"**N**" Series: **N**on-oil	N95	95%
	N99	99%
	N100	99.97%
"**R**" Series: oil-**R**esistant	R95	95%
	R99	99%
	R100	99.97%
"**P**" Series: oil-**P**roof	P95	95%
	P99	99%
	P100	99.97%

Air Quality

Compressed air, compressed oxygen, liquid air and liquid oxygen used for respiration shall be of high quality/Purity;

Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen;

Cylinders of purchased breathing air shall meet at least the requirements of the specification for Type 1 – Grade D breathing air as described in Compressed Gas Association Commodity Specifications G-7.1-1989;

Cylinders of purchased breathing air should have certificate of analysis from the supplier that the breathing air meets the requirements of Type 1 – Grade D air;

Compressed oxygen shall not be used;

Oxygen must never be used with airline respirators. Breathing air may be supplied to respirators from cylinders or air compressors;

Cylinders shall be tested and maintained as prescribed in the shipping Container Specification Regulations of the Department of Transportation (49CFR PART 173 and 178);

Oxygen concentrations greater than 23.5% are to be used only in equipment designed for oxygen service distribution;

Moisture content in the cylinder shall not exceed a dew point of -50 degrees F at 1 atmosphere;

Supplied Air compressors purchased or rented by Posillico Inc. for supplying air shall be equipped with the necessary safety and standby devices. A breathing–air type compressor shall be used. The type compressor used shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable inline air purifying absorbent beds and filters installed to further assure breathing air quality. The filter panel must have a tag indicating the last absorbent bed, filter change out and PM work, as well as the signature of the person authorized to perform the change. A receiver of sufficient capacity to enable the respirator wearer to escape from the contaminated atmosphere in the event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high temperature alarm is installed in the system, the air from the compressor shall be frequently tested for carbon monoxide to ensure that levels are below the exposure limit for carbon monoxide (currently 10 ppm);

Air-line couplings used shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air-line respirators with non-respirable gases or oxygen;

Compressor shall be set up to minimize moisture content; and

Breathing gas containers shall be properly marked and stored in accordance with NIOSH respirator certification standard 29 CFR 1910.101.

Cleaning and Disinfecting

Respirators shall be regularly cleaned and disinfected using the procedures in Appendix B-1 of the Respirator standard or in accordance with the manufacturers written instructions

Respirators are required to be cleaned prior to each use, and thereafter as required;

Respirators used in fit testing and training shall be cleaned and disinfected before and after each use.

Respirator cleaning will take place prior to the shift ending.

All cleaning supplies will be provided.

The following procedure is recommended for cleaning and disinfecting respirators:

- Remove any filters, cartridges or canisters;
- Wash face piece and breathing tube in cleaner-disinfectant or detergent solution (see following paragraphs). Use a hand brush to facilitate removal of dirt;
- Rinse completely in clean, warm water;
- Wipe off excessive water, then air dry in a clean area;
- Clean other respirator parts as recommended by manufacturer;
- Inspect valves, head straps and other parts, replace with new parts if defective;
- Insert new filters, cartridges or canisters, make sure seal is tight; and
- Place in a sealable plastic bag or container for storage.

Cleaner-disinfectant solutions shall be used to effectively clean respirators The respirator should be immersed in the solution, rinsed in clean, warm water and air-dried; and

Strong cleaning and disinfecting agents can damage respirator parts. Temperatures above 185 degrees Fahrenheit and vigorous mechanical agitation should not be used. Solvents, which affect elastnomer or rubber parts, should be used with caution.

Storage

Respirators shall be stored in a convenient, clean and sanitary location;

After inspection, cleaning and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals;

Respirators placed at stations and work areas for emergency use should be stored in weather tight compartments built for the purpose, be quickly accessible at all times and be clearly marked;

Respirators should not be stored in such places as lockers or toolboxes unless they are in carrying cases or cartons;

Respirators should be packed or stored so that the face piece and exhalation valve will rest in a normal position and function will not be impaired by the elastnomer setting in an abnormal position;

Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in “use and care” instructions usually mounted inside the carrying case lid; and

Emergency use respirators placed at stations and work areas for emergency use shall be immediately accessible at all times and shall be stored in compartments built for the purpose and in accordance with the manufacturer’s recommendations. These compartments shall be clearly marked. Instructions for proper storage of emergency respirators, such as gas masks and SCBA, can be found in use and care instructions typically mounted inside the carrying case lid.

Routine Inspections

All respirators shall be inspected routinely before and after each use. The manufacturer’s inspection criteria shall be used as the basis for the inspection.

Emergency escape respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in working condition. Emergency escape only respirators shall also be inspected before being carried into the work area. The respirator manufacturer’s inspection criteria shall be used as the basis for the inspections. A record shall be kept of inspection dates and findings for respirators maintained for emergency use.

Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer’s instructions. It shall be determined that the regulator and warning devices function properly.

Respirator inspection shall include a check of the tightness of connections and the condition of the face piece, headband, valves, connecting tube and canisters;

Rubber or elastnomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber of elastnomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage;

Random inspections shall be conducted to assure that respirators are properly selected, used, cleaned and maintained. The respirator manufacturer’s inspection criteria shall be used as the basis for inspections. Each jobsite will identify and document the employees who will perform random inspections; and

Replacement or repair. Only the site Safety Representative or designated individual, with NIOSH approved parts designed for the respirator, shall do replacement or repairs. No attempt shall be made to replace components or make adjustments or repairs beyond the manufacturer’s recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair. Respirators that have failed inspection will be taken out of service.

Training

General

For safe use of any respirator, it is essential that the user be properly instructed in his/her selection, use and maintenance and use.

Training shall be provided to each affected employee:

- Before the employee is first assigned duties that require respiratory protection and at a minimum, annually thereafter;
- Before there is a change in assigned duties;
- Whenever there is a change in operations that present a hazard for which an employee as not previously been trained;
- Whenever there is a reason to believe that there are deviations from established respiratory procedures required by this instruction or inadequacies in the employee's knowledge or use of these procedures; and
- The training shall establish employee proficiency in the duties required by this instruction and shall introduce new or revised procedures, as necessary, for compliance with this instruction or when future revisions occur.

Training topics shall include, as a minimum:

- Respiratory Protection Program;
- The OSHA Respiratory Protection standard;
- Respiratory hazards encountered within the scope of work and their health effects; whether acute, chronic or both, and an honest appraisal of what may happen if the respirator is not used;
- Need for respiratory protection and the consequences of improper fit, use, or maintenance;
- Proper selection and use of respirators;
- Inspection and seal checking of respirators;
- Limitations and capabilities of respirators;
- Respirator donning and user seal (fit) checks;
- Emergency use procedures; Classroom and field training to recognize and cope with emergencies. This will include situations where the respirator malfunctions;
- Maintenance and storage procedures;
- Medical signs and symptoms limiting the effective use of respirators;
- Explanation of why more control that is positive is not immediately feasible. This shall include recognition that every reasonable effort is being made to reduce or eliminate the need for respirators; and
- Fit Evaluation: the wearer shall be trained how to check the facepiece’s fit each time they put on the respirator by conducting a positive/negative pressure seal check as specified In appendix B -1 of the respiratory protection standard.

Record keeping

The following records shall be kept at the jobsite:

Medical Evaluation Questionnaire result(s);

Fit Test Records;

Air Sampling Worksheets for each sample;

Chain of Custody for each sample;

Laboratory sample analysis for each sample;

Calculations of exposure;

Employee exposure notification records; and

Training records.

The following records shall be kept at the Corporate Safety and Environmental Department:

Medical Evaluation Questionnaire result(s);

Fit Test Records;

Air Sampling Worksheets for each sample;

Chain of Custody for each sample;

Laboratory sample analysis for each sample; and

Calculations of exposure.

APPENDIX M

MONITORING INSTRUMENTS: USE, CARE, AND CALIBRATION

MONITORING INSTRUMENTS: USE, CARE, AND CALIBRATION

Introduction

Prior to beginning any work at Posillico sites, a preliminary site evaluation must be conducted to identify the hazards or suspected hazards of the site. Through area and personal monitoring with direct-reading instruments and personal sampling pumps, hazardous conditions can be evaluated, and the proper level of protection chosen for the specific type of work activity. Monitoring equipment used by Posillico personnel includes the following: Photoionization Detectors (PID); Personal Sampling Pumps; and, Colorimetric Tubes. This program contains a description of each type of monitoring equipment; hazards for which it can be used to monitor; Applications; Care and Maintenance; Limitations; and, Calibration.

Scope

This program covers the use, application, care and maintenance, limitations and calibration of PIDs, Personal Sampling Pumps and Colorimetric Tubes used by Posillico employees in hazardous materials operations. Posillico employees engaged in activities involving hazardous materials includes the Hazardous Waste Division and the Air Division.

Instrumentation

1. Photoionization Detectors (PIDs)

<u>Introduction</u>

PIDs measure a variety of gases in many industrial, as well as hazardous material, operations. These analyzers employ the principle of photoionization, which is the absorption of ultraviolet light by molecules, for detection.

The sensor consists of a sealed ultraviolet light. The energy ionizes many trace species (particularly organics) but does not ionize the major components of air, such as O_2, N_2, CO, CO_2, or H_2O. A chamber adjacent to the ultraviolet source contains a pair of electrodes. When a positive potential is applied to one electrode, the field created drives any ions, which are formed by absorption of the UV light, to the collector electrode, where the current (proportional to the concentration) is measured.

To minimize absorption of various sample gases, the ion chamber is made up of an inert fluorocarbon material, located at the sampling point, and a rapid flow of sampling gas is maintained through the small ion chamber volume.

The analyzer will operate either from a rechargeable battery for up to 10 hours, or continuously from the AC battery charger.

The useful linear range of the instrument is from a fraction of a part per million to about 2000 PPM.. A Summary of relative FID responses can be found in Attachment B. Calibration logs are in Attachment A.

Theory

Posillico utilizes the MiniRAE meter or equivalent as its PID. The MiniRAE is a portable, non-specific vapor/gas detector. The MiniRAE employs the principle of photoionization to detect a variety of chemical compounds, both organic and inorganic.

The MiniRAE contains an ultraviolet light source within its sensor chamber. Ambient air is drawn into the chamber with the aid of a small fan or positive displacement pump. If the ionization potential (IP) of any contaminant present in the ambient air is equal to or lower than the energy of the UV light source, ionization will take place, causing a deflection in the meter.

Response time for the MiniRAE is approximately 90% at 3 seconds. The meter reading is expressed in parts per million (PPM) relative to the calibration gas. All readings must be stated as equivalent readings that depend on the calibration gas being used to calibrate the MiniRAE. The calibration gas used is Isobutylene. Formerly, benzene was used as the calibration gas, but due to its hazard it is no longer used. Isobutylene, used as an equivalent in place of benzene, allows the instrument to provide results in benzene equivalents.

A list of IPs for various gases is provided in the latest edition of the NIOSH Pocket Guide to Chemical Hazards.

Basic Operation of the MiniRAE

A sample of air is drawn through a chamber and an ultraviolet light causes certain contaminants present to be broken apart into positive and negative charged particles. These charged particles are passed between electrodes and converted into an electrical impulse displayed on the readout.

Field Applications/Limitations

a. The MiniRAE will only detect organic materials with an ionization potential less than 10.2eV.

b. It is a non-specific detection device, but provides continuous information on airborne concentrations.

c. It will not respond equally to all contaminants, and does not detect methane.

d. High humidity will cause the instrument to give lower readings than the actual airborne concentration.

e. Transfer of the instrument from a cold to a warm environment may cause condensation to form on the UV light source window, causing erroneous results.

f. The readout may also be affected by electrical power lines or power transformers.

g. Total concentrations are relative to the calibration gas used (isobutylene). Therefore, true concentrations cannot be identified. And, while the instrument scale reads 0-2000 ppm, response is linear (to isobutylene) from 0-600 ppm.

h. Wind speeds of greater than 3 mph may affect the pump and readings, depending on the position of the probe relative to wind direction.

Calibration Procedure

Calibration Checklist: MiniRAE; Span gas (HNu Manufactured); Regulator; Tygon tubing.

Cleaning and Calibration Checklist: Same materials as above; MiniRAE cleaning compound; Fine screwdrivers, flat and Phillips head; Sonnicator; Drying/Toaster oven.

Inventory Items: Battery; Lamp; ION chamber; O-Rings; Screws.

a. Obtain calibration gas, Isobutylene at Span 9.8 with 10.2 eV, manufactured by MiniRAE.

b. Connect the calibration gas to the end of the probe extension. Open the gas flow valve.

c. Turn the selection knob to the 0-200 range and observe the meter needle. The concentration should read the same as that listed on the cylinder. If not, the span should be adjusted until the meter reads accurately.

d. The above procedure can be used until the span reading is approximately 5. At this time, the meter needs to be cleaned and internally calibrated. See Step 5.

e. For cleaning and internal calibration:

- Disassemble the probe, carefully removing the lamp.
- Clean the lamp.
- Clean the ION chamber and probe extension.
- Remove the instrument from its housing to expose the calibration screw, located on the side of the instrument.
- Once the probe parts have cooled (assuming it has been used), assemble the probe and connect it to the instrument.
- Connect the calibration gas to the end of the probe extension and open the gas flow.
- Turn the selection knob to the 0-200 range and observe the needle. The concentration should read the same as the concentration listed on the cylinder. If not, then the calibration screw must be adjusted with a fine screwdriver.

Maintenance and Calibration Records

a. Protect the instrument from excessive abuse, such as moisture, shock, vibration, etc.

b. Maintenance and calibration records will be recorded in a logbook specific to the MiniRAE meter. See PID Calibration Log in Attachment A.

Troubleshooting

Below are some points that should be considered if the instrument is not running appropriately:

a. Check the battery condition. Recharge it if necessary.

b. If unstable readings are obtained, a faulty probe cable or electrical connection could be the problem. To check this, hold the probe normally and flex the cable firmly. Watch the meter needle for fluctuations as the cable is flexed. Individual wires in the readout can be checked in a similar way.

c. Check the coaxial connector on the amplifier board in the probe for any separation.

d. Determine whether or not the meter is being used in close proximity to AC power lines or power transformers. This can cause the instrument to read erroneously. To check for this interference, zero the instrument in an electrically quiet area in the standby position, and then move the instrument into the area in question. If AC pick-up is a problem in the area, then the meter will indicate the magnitude of the problem.

e. No response on any setting may mean that the meter movement is broken. Tip the instrument from side-to-side. The needle should move freely and return to zero.

f. No response may mean that the electrical connection to the meter is broken. Check all wires leading to the meter and clean the contacts of the quick-disconnects.

g. No response may mean that the battery is completely dead. Disconnect the battery and check the voltage with a volt-ohm meter. Also check the 2-amp fuse.

h. If the meter responds in the BATT CHK mode, but reads zero or near zero for all other modes, the power supply may be defective.

   - Replace the power supply.

   - Check the input signal connection, which may be broken in the probe or readout.

   - Check the input connector on the printed circuit board inside the probe. It should be firmly pressed down.

   - Check the components on the backside of the circuit board. All connections should be solid and no wires should touch any other object.

   - Check all wires in the readout for solid connections.

i. When the instrument responds appropriately in the "BATT CHK" and "STANDBY" positions, but not in the measuring mode, check to see that the light source is on.

j. If the instrument responds correctly in all settings, but the signal is lower than expected:

   - Check the span setting.
   - Clean the window of the light source.

- Check the fan for proper insertion.

k. If the instrument response is slow and/or not reproducible, either the fan is operating improperly (check the fan voltage), or the instrument needs to be recalibrated.
l. A low battery indication comes on if the battery charge is low. It will also come on if the ionization voltage is too high.

2. Colorimetric Indicator Tubes

Colorimetric indicator tubes are used to measure concentrations of specific gases and vapors, both organic and inorganic. When used appropriately, an indicator tube specific to a certain compound will produce a stain in the tube. The length of the stain (or color change) is proportional to the compound's concentration. Minimal operator training and expertise is required to operate this type of sampling instrument.

Limitations

Colorimetric indicator tubes are cross-sensitive, meaning that other compounds may trigger a similar response, which will give the user a false reading. The user must take this fact into account when he/she dealing with a situation containing unknowns.

Other limitations include individual interpretation concerning the length of the stain, the limited accuracy of the tube, and use in high humidity. The greatest sources of error occur in different interpretations that are obtained between individuals as to how far the stain has gone on the tube, and the tubes limited accuracy. Users must remember that the tubes are **25% accurate**. A simple calculation will tell the user the range in which the correct reading could possibly occur.

With this in mind, any discoloration on the tube should alert the user as to the appropriate protection required for the site. High humidity also affects the readings. Use in humid environments tends to clog the filtering medium, not allowing the gases or vapors to be drawn properly through the tube.

Maintenance and Calibration

Posillico utilizes the Draeger Model 31 Bellows-type pump for colorimetric tube sampling. General maintenance for this type of instrument includes: avoiding rough handling which may cause channeling; performing a leakage test before sampling each day (including documentation); calibrating the unit at least quarterly; providing an inventory of tubes, with expiration dates; and, appropriate storing.

Rough handling of this instrument may cause erroneous results due to channeling (leakage). Therefore, the unit must be handled carefully and not be stored outside of its protective carrying case when not in use.

It may be necessary to clean the rubber bung (tube holder) if a large number of tubes have been taken with the pump. A mild soap and water solution can be used.

Leak Test

Before each day's use, the user will perform a leak test on the instrument. This is a simple test and includes the following:

a. Squeeze the bellows of the pump and insert an unopened detector tube, attempting to draw 100 ml of air.

b. After a few minutes, examine the bellows for any expansion. Document the findings in the Site Monitoring Log Book. If the pump does not pass the leak test, it will be removed from service immediately and returned to the Facility Manager, to be sent out for repair.

Calibration Test

At least quarterly, the instrument will be calibrated for proper volume measurement. Equipment needed for the calibration test is: 100 ml burette and ring stand; stopwatch; soap solution; detector tube with both ends broken off; and, tygon tubing.

The calibration test is performed as follows:

a. Break both ends of a colorimetric tube and connect it in-line with the pump.

b. Connect the instrument directly to a bubble burette, and create a bubble inside the burette by touching the bottom of the burette to the soap solution.

c. Squeeze the bellows to exhaust all the air out of the unit.

d. Release the bellows and wait 5 minutes for the full volume of air to be drawn into the bellows. The bubble should stop between the 95 and 105 cc marks. Errors of 5% are permissible; if the error is greater than 5%, return the pump to the Facility Manager, to be sent out for repair.

Inventory and Storage Requirements

To inventory the tubes, check the expiration date marked on the storage container. No tubes will be allowed for use past the manufacturer's expiration date. A listing of tubes that are readily available will be maintained by the Health and Safety Coordinator. This list will contain the name of the tube and the expiration date of those available. The list will be updated monthly and provided to the Facility Manager and each Field Division. All colorimetric tubes will be stored in the refrigerator in the Chemical Storage Area. Refrigeration helps to maintain shelf life. Any tubes that have been previously opened and inadvertently stored in the refrigerator will not be used in the field. Colorimetric tubes are not reusable, and any reuse will result in erroneous results.

3. Personal Monitoring Pumps

Personal monitoring involves the collection of an air sample by a sampling device worn by the worker. The sampling device is worn as close as possible to the breathing zone of the individual so that the data collected closely approximates the concentration inhaled. Personal monitoring pumps are used when it is necessary to monitor the workers' exposure to air contaminants.

Personal monitoring pumps can be classified into three basic categories:

a. Low-Flow Pumps (0.5 - 500 ml/min);
b. High-Flow Pumps (500 - 4500 ml/min);
c. Dual Range Pumps.

Low-flow pumps are used for gas and vapor sampling. For example, the common flow rate for organic vapors is 200 ml/min.

High-flow pumps are used for particulate sampling as well as gas and vapor sampling. A common flow rate for fumes or dust sampling (i.e. zinc fume or asbestos) is 2 L/min.

Limitations

The major disadvantage in personal monitoring is the lag time between sampling and obtaining analysis results, which may take weeks, days or months if a remote laboratory is used. If a situation requires an immediate decision concerning worker safety, this can be a serious problem. Therefore, personal monitoring is rarely used for site characterization. Its main purpose is to assure effectiveness of work practice and engineering controls.

A second disadvantage is that multiple exposures may require the use of a variety of sampling media. Unfortunately, workers cannot carry multiple sampling media because of the added strain. Also, it is not usually possible to draw air through different sampling media using a single, portable battery operated pump. Several days may be required to measure the exposure of a specific individual to the variety of chemicals on site. Alternatively, if workers are in teams, a different monitoring device can be assigned to each team member.

Calibration

The following procedure will be used for calibration with a primary calibration source for all personal monitoring pumps used by Posillico. It has been taken from OSHA Instruction CPL 2-2.20B, Appendix 1-C, Manual Bubble Meter Technique.

Electronic bubble meters are also used as primary calibration sources. These meters have a digital read-out and the ability to give a printed copy for documentation of the pump flow rate. Posillico uses a Spectrex Model BFM-4000 for this purpose.

NOTE:
When calibrating with a bubble meter (either manual or electronic), the use of adapters can cause moderate to severe pressure drop in the sampling train, which will affect the calibration result. If adapters are used for sampling, then they should be used when calibrating.

a. Connect the collection device, tubing, pump and calibration apparatus (see figure 4.1).

b. Conduct a visual inspection on all tygon tubing connections.

c. Wet the inside of a one-liter burette with a soap solution.

d. Turn on the pump and adjust the pump rotameter to the appropriate flow rate setting.

e. Momentarily submerge the opening of the burette in order to catch a film of soap.

f. Draw 2 or 3 bubbles up to the burette in order to insure that the bubbles will complete their run.

g. Visually capture a single bubble and time the bubble from 0 - 1000 ml for high flow pumps or 0 - 100 ml for low flow pumps.

h. The timing accuracy must be within 1 second of the time corresponding to the desired flow rate.

i. If the time is not within the range of accuracy, adjust the flow rate and repeat steps g and h until the correct flow rate is achieved.

j. While the pump is running, mark the pump or record on the air sampling worksheet the position of the center of the float in the pump rotameter as a reference.

k. Repeat bubble timing for 3 times. Calculate the average time given by these measurements.

l. Calculate the flow rate as follows:
(NOTE: 1L = 1000 ml)

$$\frac{\text{Measured Volume (L)}}{\text{Average Seconds}} \times \frac{\text{60 Seconds}}{\text{1 Min}} = \text{L/min}$$

For Example:

$$\frac{\text{1 L}}{\text{38 sec}} \times \frac{\text{60 Sec}}{\text{min}} = \text{1.6 L/min (round to m) 2 digits)}$$

Repeat the procedures for all pumps to be used for all calibrations involving the same sampling method.

Different contaminants have different sampling protocols, which may result in different calibration protocol. Contact the Posillico Certified Industrial Hygienist or Health and Safety Coordinator for chemical-specific calibration protocols.

Checklist for Using Personal Monitoring Pumps

a. Look at measurement method in NIOSH Pocket Guide to Chemical Hazards (Latest edition).

b. Calibrate with a primary calibration source, as described in the calibration procedures.

c. Record information of air sampling worksheet and calibration logbook.

d. Make sure battery is fully charged. Air pumps have NiCd battery, which creates a memory. Care needs to be used so as to not recharge a battery that has been used for only a few hours. Recharge a battery only if it has been used for at least 8 hours. There are chargers which will completely discharge a battery before recharging; or, the pumps can be left running until the battery is rundown completely and then recharged to eliminate this memory, also.

e. Check sample requirement sheet or NIOSH method to see the minimum time/volume for the sample. An 8-hour sample period would allow for the best measure, giving an 8-hour TWA exposure.

4. Radiation Monitoring

Radiation Monitoring involves the measurement of radiation dose or radionuclide contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances, and the interpretation of the results. The Geiger counter is a particle detector that measures ionizing radiation. It detects emissions of particles from Alpha, Beta and Gamma rays by the ionization produced a low pressure tube in the Geiger counter.

Limitations

There are two main limitations of the Geiger counter. Because the output pulse from a Geiger-Muller tube is always the same magnitude regardless of the energy of the incident radiation, the tube cannot differentiate between certain radiation types. A further limitation is the inability to measure high radiation rates due to the "dead time" of the tube. This is an insensitive period after ionization of the gas during which any further incident radiation will not result in a count. Typically the dead time will result in an upper count rate limit depending on the characteristic of the tube being used. Therefore ion chamber instruments are used for high radiation rates.

Calibration

Calibration is performed by the manufacturer on a periodic (usually annual) basis. The Geiger Mueller (GM) detector is capable of measuring α, β, γ, and X radiations. This instrument will measure count rates over a range of 0–500,000 counts per minute.

5. Dust/ Particle Monitoring

The following procedure will be used for calibration and maintenance with a primary calibration source for particle monitoring equipment used by Posillico. It has been taken from OSHA Technical Manual: Section 2 Chapter 3, On Site Measurements.

Application and Principle of Operation

Condensation-nuclei counters are based upon a miniature, continuous-flow condensation nucleus counter that take particles too small to be easily detected, enlarges them to a detectable size, and counts them. Sub micrometer particles are grown with alcohol vapor as they pass through a heated saturator lined with alcohol–soaked felt, and then condense the alcohol on the particles in a cooled condenser. Optics focus laser light into a sensing volume.

As the droplets pass through the sensing volume, the particles scatter the light. The light is directed onto a photodiode which generates an electrical pulse from each droplet. The concentration of particles is counted by determining the number of pulses generated. Applications include the testing of respirators and real-time dust monitors.

A counter totals individual airborne particles from sources such as smoke, dust, and exhaust fumes. Models typically operate in one of three possible modes, each with a particular application. In the "count" mode, the counter measures the concentration of these airborne particles. In the "test" (or fit test) mode, measurements are taken inside and outside a respirator and a fit factor is calculated. In the "sequential" mode, the instrument measures the concentration on either side of a filter and calculates filter penetration.

This instrument is sensitive to particles as small as 0.02 micrometers. However, it is non-specific to variations in size, shape, composition, and refractive index.

Calibration

Check the counter before and after each use in accordance with the manufacturer's instructions. This procedure usually involves checking the zero of the instrument. Annual calibration is handled through the CTC.

Maintenance

Reagent-grade isopropyl alcohol for use in these types of instruments can be obtained from the CTC Agency Expendable Supply Program.

Isopropyl alcohol must be added to the unit after 5–6 hours of operation under normal conditions. Take care not to overfill the unit. A fully charged battery pack will normally last for about 5 hours of operation. Low battery packs should be charged for at least 6 hours. Battery packs should not be stored in a discharged condition.
Storage preparation (always follow the manufacturer's recommendations):

Dry the saturator felt by installing a freshly charged battery pack without adding alcohol. Allow the instrument to run until the LO message (low battery) or the E-E message (low particle count) appears. Some instruments allow you to remove the alcohol cartridge for storage purposes.

Remove the battery pack and install the tube plugs into the ends of the twin-tube assembly.

ATTACHEMENT A

PID CALIBRATION LOGS

POSILLICO ENVIRONMENTAL, INC.

PID CALIBRATION LOG

IMPORTANT: Instruments that do not pass calibration will not be used in the field. Contact the Facility Manager IMMEDIATELY for the instrument to be sent out for repair.

Model #:________________________________ Serial #:___________________

Date	Calibrated By	Repair Necessary (Y or N)	Initials
Span	Reading	Reading	Setting

APPENDIX N

DAILY SAFETY HUDDLE FORM

DAILY SAFETY HUDDLE FORM

Date:	
Job Number:	**Job Name:**
Person Conducting Huddle:	
Topics Discussed:	
Identified Hazards:	
Controls:	

Sign In:

(Print)	(Sign)

Supervisor Signature:	**Date:**

APPENDIX O

SITE SAFETY AUDIT FORM

WEEKLY CONSTRUCTION SAFETY AUDIT

DATE OF INSPECTION:____________________________ PROJECT NAME:

INSPECTOR: ______________________________________ PROJECT NO:

CONSTRUCTION SAFETY CHECKLIST

FIRST AID AND EMERGENCY	OK	Action Needed
First aid supplies/eye wash	❒	❒
Certified First Aiders/CPR	❒	❒
Emergency Numbers Posted	❒	❒
Access to site Clear	❒	❒

HOUSEKEEPING AND SANITATION	OK	Action Needed
Work Areas/Passageways Clear	❒	❒
Toilets adequate and Clean	❒	❒
Drinking Water Available	❒	❒
Waste Containers Provided & Used	❒	❒

FIRE PREVENTION & PROTECTION	OK	Action Needed
Fire Hazards Analyzed	❒	❒
Fire Extinguishers Maintained	❒	❒
Adequate Fire Extinguishers	❒	❒
Fire Extinguishers Inspected	❒	❒
Proper Flammable Storage/ Use	❒	❒
No Open Flames	❒	❒
Gas Cylinders- Use & Storage	❒	❒
Regulators not damaged	❒	❒
Caps on while in storage	❒	❒
Cylinders secured	❒	❒

PERSONAL PROTECTIVE EQUIPMENT	OK	Action Needed
Hard Hats Worn at All Times	❒	❒
Eye Protection Worn at All Times	❒	❒
Hearing Protection as Required	❒	❒
Respirators as Required	❒	❒
Medical Clearance and Fit Tested	❒	❒
Fall Protection ~ per the Site Plan	❒	❒
High Visibility Vests worn	❒	❒
Medical Clearance and Fit Tested	❒	❒
Fall Protection equip. checked daily	❒	❒

ELECTRICAL INSTALLATIONS	OK	Action Needed
Electrical Dangers Posted	❒	❒
Temporary Lighting Adequate	❒	❒
Heavy Duty Adequate Wiring	❒	❒
Safe/ Sufficient # of Outlets	❒	❒
GFCI's used properly	❒	❒
Cords and tools inspected daily	❒	❒
Circuit Breakers labeled	❒	❒

LADDERS AND SCAFFOLDING	OK	Action Needed
Proper Construction/Condition	❒	❒
Proper placement & Secured	❒	❒
Guardrails/ Toeboards/Screening	❒	❒
Working areas free of Debris	❒	❒

HOISTS, CRANES, AND DERRICKS	OK	Action Needed
Adequate Clearances	❒	❒
Load Capacity & Proper Usage	❒	❒
Clearances to Energized Equipment	❒	❒
Hand/Voice Communications	❒	❒
Swing Radius Protected	❒	❒
Annual Inspection Current	❒	❒

EXCAVATION & SHORING	OK	Action Needed
Competent Person designated	❒	❒
Shoring for Soil & Depth	❒	❒
Spoil Bank & Equip. Distances	❒	❒
Access Provided	❒	❒
Water Controlled	❒	❒
Equipment Ramps Adequate	❒	❒
Utility Markout Completed	❒	❒
Utility Markout Maintained	❒	❒

HANDLING AND STORAGE OF MATERIALS	OK	Action Needed
Proper Material Handling	❒	❒
Stacks Secure/Neat/Protected	❒	❒
No Excessive Heights	❒	❒
Stored Away From Openings	❒	❒
Rigging inspected by competent person	❒	❒
Proper Rigging selected/used	❒	❒
Items stacked/racked or cribbed	❒	❒
Rigging done by qualified person	❒	❒
Rigging stored properly	❒	❒

MOTOR VEHICLES / HEAVY EQUIPMENT	OK	Action Needed
Brakes/ Lights/ Warning Devices	❒	❒
Traffic Controllers as Required	❒	❒
Heavy Equipment Wheels Chocked	❒	❒
Seat Belts Used	❒	❒
Daily inspection of all mobile equip.	❒	❒
Spotter for backing vehicles	❒	❒
Cabs clean of trash & debris	❒	❒

Construction Safety Checklist

TOOLS, HAND & POWER

	OK	Action Needed
Proper Tool For Each Job	❐	❐
Daily Inspection and Maintenance	❐	❐
Proper Instruction In Use	❐	❐
All Required Guards In Place	❐	❐
GFCI's used on all power cords	❐	❐

BARRICADES AND RAILINGS

	OK	Action Needed
Floor Openings Protected/marked	❐	❐
Midrails & Toeboards in place	❐	❐
Open Sided Floors Protected	❐	❐
Trenches/ Excavations Protected	❐	❐
Guardrails withstand 200lb force	❐	❐
Scaffolds checked daily-Competent Per .	❐	❐

MISCELLANEOUS

	OK	Action Needed
Safe Entrances/ Exits Provided	❐	❐
OSHA Act & Warning Signs Posted	❐	❐
Task Safety Training Provided	❐	❐
Public & Property Protected	❐	❐
Proper Welding & Cutting	❐	❐
Proper & Safe Demolition	❐	❐
Spill Containment kits on-site	❐	❐
Safety Nets/ Catch Platforms	❐	❐
Stairway Railings/ Stairs Fille	❐	❐
Lock Out/ Tag Out as Required	❐	❐
Conveyor Belts, Inspected,	❐	❐
Impalement Hazards Protected	❐	❐
Required Rebar caps in place	❐	❐
Mobile Equipment secured on barges	❐	❐

TRAFFIC MAINTENANCE	**OK**	**Action Needed**
Cones/Barrels/Barricades in proper position	❐	❐
Cones/Barrels/Barricades in good condition	❐	❐
Signs mounted properly	❐	❐
Signs visible and in good condition	❐	❐
Lane markings visible and in proper position	❐	❐
Night lighting adequate for safe operations	❐	❐
Arrow boards working properly and secured	❐	❐
Work zones secure to unauthorized entry	❐	❐

POWDER-ACTIVATED TOOLS	**OK**	**Action Needed**
Laws and ordinances complied with	❐	❐
Operators qualified – vendor trained	❐	❐
Controlled storage	❐	❐
Competent instructions & supervision	❐	❐
Inspection & maintenance	❐	❐
Protection of other workers	❐	❐
Safety goggles or face shield	❐	❐
Licensed for each type of tool used	❐	❐

CONFINED SPACE PROCEDURE

Confined Space entry training conducted	❐	❐
Signs posted to identify confined spaces	❐	❐
Personal protective equipment specified	❐	❐
Standby person	❐	❐
Emergency equipment for standby person	❐	❐
Permit required precautions taken	❐	❐
All required signatures for entry/testing	❐	❐
Permits posted prior to start of work	❐	❐
Permits retained a minimum of two years	❐	❐

PILE DRIVING

Proper storage of piles	❐	❐
Material handling controlled	❐	❐
Equipment inspected and maintained	❐	❐
Piledriving rigs properly supported	❐	❐
Ladders on frames and stirrups used	❐	❐
Cofferdams maintained and inspected	❐	❐
Adequate water pumping available	❐	❐
Tag lines used	❐	❐
Safety harnesses and lifelines used	❐	❐
Proper signaling	❐	❐
Barricaded as required	❐	❐
Ear protection area posted	❐	❐

ITEMS NOTED/REMARKS:

____

____

____

____

ITEMS NOTED/REMARKS:

Was Subcontractor’s work also inspected? ☐ YES ☐ NO

Did subcontractor participate in inspection? ☐ YES ☐ NO

Are any items found to be “Imminent Danger”? ☐ YES ☐ NO

Inspector's Signature

Project Manager’s Signature

Area Manager’s Signature